# LAND-USE PLANNING IN THE LIESBEECK-BLACK RIVER CONFLUENCE AREA: MANAGEMENT RECOMMENDATIONS AND LAND-USE ALTERNATIVES

by

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* My supervisor, Mike Meadows, for having to "grind" through drafts of this dissertation.

# ABBREVIATIONS:

| | |
|---|---|
| asl | above sea level |
| ACRC | Alexandra Care and Rehabilitation Centre |
| BLR | Baseline Report |
| C-BR | Culemborg-Black River |
| CBD | Central Business District |
| CCC | Cape Town City Council |
| CMA | Cape Metropolitan Area |
| dB(A) | Decibel |
| EIA | Environmental Impact Assessment |
| EIR | Environmental Impact Report |
| ENGEO | Environmental and Geographical Science |
| EPZ | Export Processing Zone |
| FRD | Foundation for Research Development |
| ha | Hectares |
| I&APs | Interested and Affected Parties |
| ICM | Integrated Catchment Management |
| IEM | Integrated Environmental Management |
| IMDF | Interim Metropolitan Development Framework |
| LUPO | Land Use Planning Ordinance No.15 of 1985 |
| MGV | Maitland Garden Village |
| MPhil | Master of Philosophy |
| MOSS | Metropolitan Open Space System |
| MRC | Medical Research Council |
| NMC | National Monuments Council |
| *pers comm.* | Personal Communication |
| PPA | Physical Planning Act 125 of 1991 |
| RBS | Raapenberg Bird Sanctuary |
| SAAO | South African Astronomical Observatory |
| SARCC | South African Rail Commuter Corporation |
| SATS | South African Transport Services |
| UCT | University of Cape Town |

| | |
|---|---|
| VH | Valkenberg Hospital |
| VPH | Vincent Pallotti Hospital |

# CHAPTER I: INTRODUCTION

## 1.1 Background

### 1.1.1 The Liesbeeck-Black River Confluence Area Study:

This dissertation is the individual analysis and evaluation of the baseline information on the Liesbeeck-Black River Confluence Area (hereinafter referred to as Confluence Area) gathered by the 1993-1994 Environmental and Geographical Science (ENGEO) Master of Philosophy (MPhil) class (see Appendix A). This dissertation is submitted to the examiners for evaluation as a partial requirement for the MPhil degree in Environmental Science.

The baseline report (hereinafter BLR) is titled "Environmental Baseline Study for Land-Use Decision-Making in the Liesbeeck and Black River Confluence Area" (ENGEO Master's Class, 1994). It contains a comprehensive description, as well as preliminary analysis, of all the environmental components (socioeconomic and biophysical) that could be of relevance to land-use planning in the area. The overall need for this study, which comprises the group BLR and the individual dissertations, arises out of the fact that the Confluence Area with its river systems, is part of a "green, open space corridor" that is under pressure from development in a city needing to densify and contain urban sprawl. There is thus potential conflict between development and other environmental considerations including that of open space retention for conservation and recreation purposes. The Cape Town City Council (CCC) suggested this study but is not a "client".

The study on the Confluence Area is intended to be of use to the CCC to enhance their ability to make sound land-use decisions for the area in the best interests of society at large. The CCC is also involved in numerous planning studies for the proposed redevelopment of a large tract of land adjacent to the study area, called the Culemborg-Black River area (hereinafter C-BR), and this study can feed into the overall planning process. This individual dissertation provides the CCC planning process with recommendations and land-use alternatives for the Confluence Area. Since the BLR forms the basis of this dissertation, they should be read in conjunction with each other.

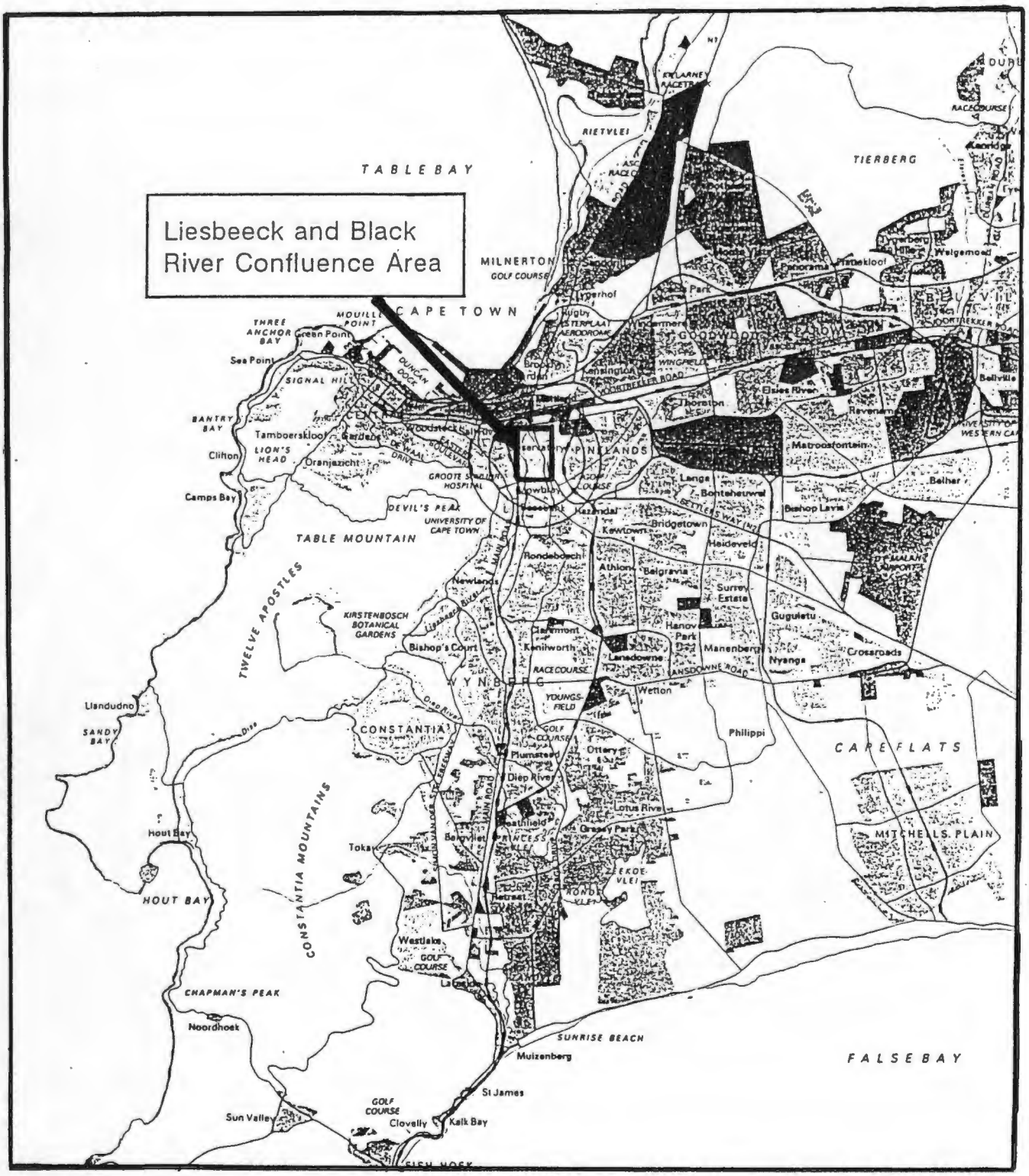
### 1.1.2 Description of the Study Area:

The description of the study area presented here is brief as it is comprehensively covered in the BLR, to which the reader is referred for a more comprehensive description.

The Confluence Area is located approximately 5.5 km east of the Cape Town's central business district (CBD) (Figure 1) and is bounded by the Liesbeeck Parkway (west), Settler's Way (N2) (south), Alexandra Road (east) and by Berkley Road and the C-BR marshalling yards (north) (Figure 2). The study area has an overall open space character, due to the river systems and the low density land-use of a number of government institutions located there (Figure 2). The institutions and the CCC own the majority of the Confluence Area land and the institutions are Valkenberg Hospital (VH), Alexandra Care and Rehabilitation Centre (ACRC) and the South African Astronomical Observatory (SAAO). The CCC land is predominantly used for public open space use and the CCC owns and administers the Raapenberg Bird Sanctuary (RBS) located on the western bank of the Black River. Other large land owners are the Vincent Pallotti Hospital (VPH), the National Monuments Council (NMC), University of Cape Town (UCT), Projection Projects (a private developer) and the railways companies of Transnet and the South African Rail Commuter Corporation (SARCC) (Figure 2). The railways land, occupying the north-western corner of the study area, is underutilised (including the Liesbeeck Sportsgrounds) and is being considered for redevelopment by the companies as part of the C-BR redevelopment. In the eastern half of the study area there are two residential areas (Maitland Garden Village (MGV); Berkley Road area) and a commercial area (near Berkley Road).

"The Confluence Area is surrounded by mostly residential, recreational and light industrial areas. Areas adjoining the study area include the Mowbray and Rondebosch golf courses in the south; Mowbray, Observatory and Woodstock (primarily residential) areas to the west; Pinelands residential area and Ndabeni industrial complex to the east; and the C-BR marshalling yards and Maitland residential/commercial area to the north" (ENGEO Master's Class, 1994, p.2).

# FIGURE 1: LOCATION


Liesbeeck and Black
River Confluence Area
TABLE BAY
CAPE TOWN
TIERBERG
MILNERTON
GOLF COURSE
RIETVLEI
RACECOURSE
THREE ANCHOR BAY
Green Point
Sea Point
SIGNAL HILL
DUNCAN DOCK
BANTRY BAY
Tamboerskloof
Clifton
LION'S HEAD
Oranjezicht
Camps Bay
DEVIL'S PEAK
UNIVERSITY OF CAPE TOWN
TABLE MOUNTAIN
TWELVE APOSTLES
KIRSTENBOSCH BOTANICAL GARDENS
Bishop's Court
Newlands
Rondebosch
Claremont
Kenilworth
RACECOURSE
WYNBERG
YOUNGS FIELD
Wetton
Philippi
CAPE FLATS
MITCHELLS PLAIN
Llandudno
SANDY BAY
CONSTANTIA
Hout Bay
HOUT BAY
CONSTANTIA MOUNTAINS
Westlake
GOLF COURSE
CHAPMAN'S PEAK
Noordhoek
SUNRISE BEACH
Muizenberg
FALSE BAY
St James
Sun Valley
GOLF COURSE
Clovelly
Kalk Bay
FISH HOEK
Plumstead
Diep River
Lotus River
Grassy Park
Retreat
Athlone
Belgravia
Surrey Estate
Guguletu
Nyanga
Crossroads
Manenberg
Hanover Park
Lansdowne
Bishop Lavis
Bonteheuwel
Langa
Bridgetown
Kewtown
Heideveld
Kensington
Thornton
Elsies River
Ravensmead
Matroosfontein
Belhar
Bellville
Welgemoed
Panorama
Parow
Goodwood
Maitland
Salt River
Woodstock
Gardens
DE WAAL DRIVE
EASTERN BOULEVARD
GROOTE SCHUUR HOSPITAL
Lowlands
Observatory
Kenilworth
Wynberg
Claremont
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Philippi
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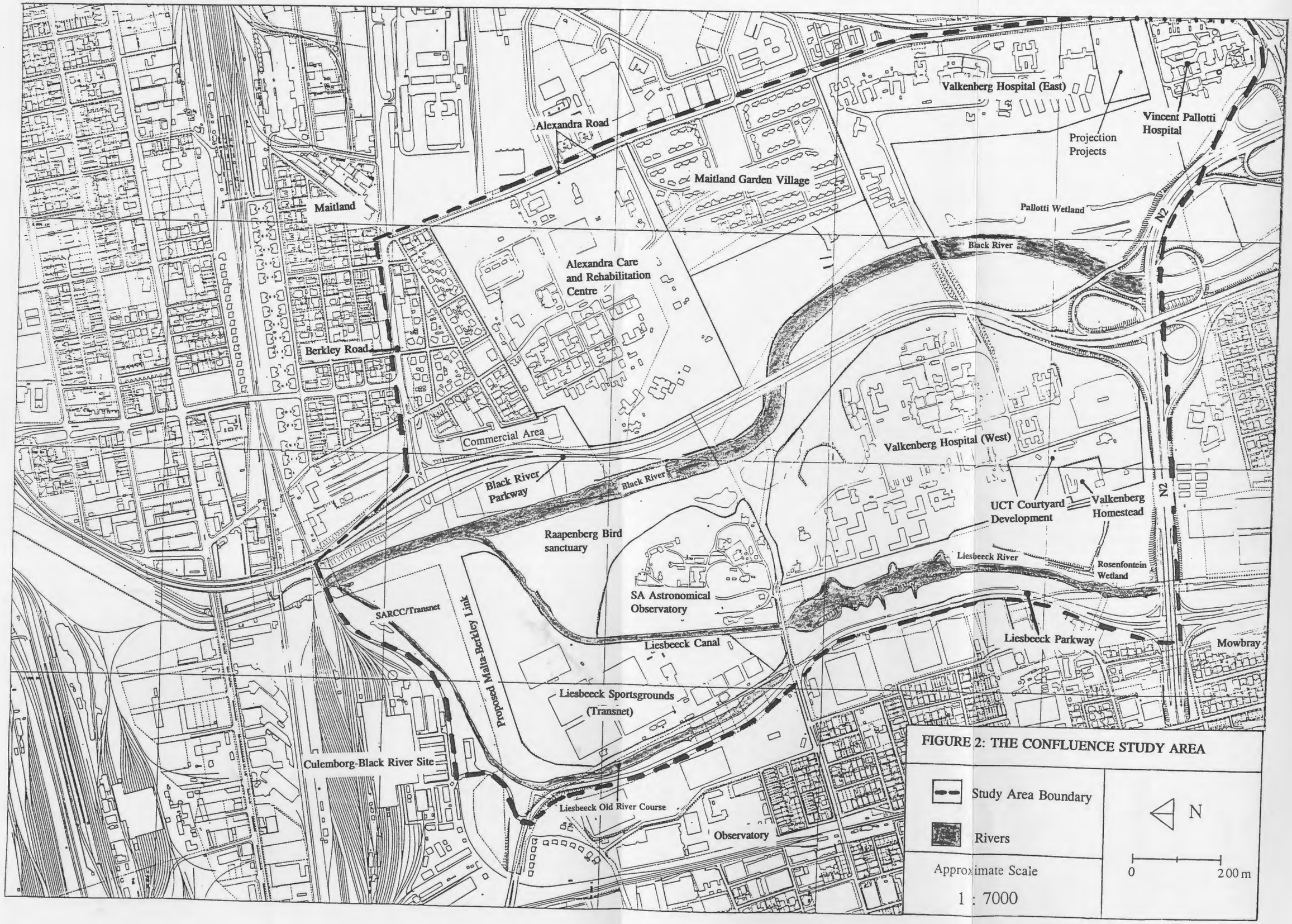



FIGURE 2: THE CONFLUENCE STUDY AREA

## 1.2 Aims and Objectives

### 1.2.1 Aims:

The overall aim of the dissertation is to aid the land-use decision-maker in undertaking more informed planning in the Confluence Area with regard to current and future land-use. The term "decision-maker", as used here, is not restricted to the commonly used Environmental Impact Assessment (EIA) terminology in the sense of there being a "...single point of authority or responsibility....at which the decision is made" (Munn, 1979, p.10). In the case of the Confluence Area, the CCC is the main decision-maker with jurisdiction over land-use planning. Munn (1979) points out that decisions are more often "shaped" than "made" and this is the case with the CCC in that various departments are involved in arriving at a specific land-use policy or plan. Taking this into account, "decision-maker" is used in a broad sense here as the term for the professionals involved in the land-use planning process (the "planners"), as well as the final point where a decision is made over a land-use policy or plan.

The specific aims of the dissertation are to:

i) provide the decision-maker with recommendations for managing current and future land-use in the Confluence Area.

ii) identify feasible land-use alternatives open to the decision-maker within the Confluence Area.

iii) provide the decision-maker with a preferred land-use scenario.

### 1.2.2 Objectives:

More specifically, the objectives of the dissertation are to:

i) analyse information contained in the BLR so as to identify problem areas in the Confluence Area which need to be addressed in current and future land-use; to produce recommendations to address these problems.

ii) identify key decision-making criteria from the analysis of information contained in the BLR.

iii) identify natural land-units in the Confluence Area which are defined by physical constraints to land-use.

iv) produce land-use alternatives for the Confluence Area land-units based on the key decision-making criteria.

v) identify a preferred land-use scenario for the Confluence Area land-units based on the land-use alternatives and academic theory.

## 1.3 Theoretical Context

This section discusses the theoretical context in which this dissertation is located, namely the fields of town planning and that of environmental evaluation. This involves a general discussion of the nature, principles and links between the two fields. The dissertation's role in the Confluence Area's land-use planning is then placed within the Integrated Environmental Management (IEM) framework.

In the broad sense "planning" entails the identification and choice of options that are open to the future and then securing the implementation of these by the allocation of resources. The role of planning as a decision-making and resource allocation process necessarily means it is political in nature, as the options chosen will affect different groups in society unequally (Roberts, 1974). Thus town planning, which comprises land-use regulation by administrative authorities in urban areas, has as one of its functions to act as a fair, just and efficient arbitration process, for arbitrating between conflicting land-uses. A second function is to ensure the economic efficiency and quality of life for people in urban land-use, and this includes the trade-off between development and the environment (Claassen and Milton, 1992). It must be noted that the term "environment" is used in its broad sense of including the biophysical and socioeconomic aspects (as used in IEM, Department of Environment Affairs, 1992). Since town planning has to consider the whole environment to achieve efficient land-use, it has to be multi-dimensional and multi-objective in approach, where different levels of objectives that are often conflicting have to be considered (Hall, 1975).

Rose (1974, p.28) considers the essential features of town planning to be that it is integrative and multi-disciplinary in character, is adaptive to change by continuously modifying preferences and goals, is democratic and participatory, is based on adequate information and considers all appropriate alternative courses of action.

Environmental evaluation as a field is essentially similar in approach to town planning. According to Fuggle (1983, p.486), the primary purpose of environmental evaluation "...is to aid decision-making by providing objective information on the environmental consequences of actions, plans and projects". An environmental evaluation should be based on the analysis of alternatives, be multi-disciplinary and consult the public to ascertain the social significance of impacts (Fuggle, 1983). These principles are shared with town planning, hardly surprising since both town planning and environmental evaluation can be seen as part of the same overall land-use optimisation process. The two fields overlap, although they have different foci. Town planning focuses on the production of land-use plans (planning) and control of land-use (administration), while environmental evaluation, particularly if applied in the form of EIAs, tends to focus on evaluating specific proposals once planning has produced alternatives. This link between production and evaluation should not be seen as linear, but rather as cyclical, as planning is iterative in the process of refining proposals. The integration of town planning and environmental evaluation is possible administratively; in Europe in 1976, the Ministers of the European Economic Community decided to strengthen existing planning and design procedures to incorporate EIAs, rather than creating new legislation (Lee and Wood, 1978). Ideally, EIAs should not only be undertaken at the development level, but also at the policy, programme and plan level. This "tiered" approach is beneficial because at the project level the options available are often limited by policy or plans made at higher levels. Furthermore, the tiering approach can help reduce the problem of cumulative impacts that can result from development where individual project EIAs are done without EIAs at higher levels of planning (World Health Organisation, 1992). However, most approaches to EIA are not well adapted to assess higher levels of planning, as assessments tend to be carried out on specific developments.

The tiering of EIAs is relevant to town planning since it produces zoning schemes and structure plans (Claassen and Milton, 1992) which regulate the development of projects. In the Confluence Area, town planning is undertaken by the CCC through the application of the Land Use Planning Ordinance 15 of 1985 (LUPO), which makes provision for zoning

schemes, and the Physical Planning Act 125 of 1991 (PPA), which makes provision for structure plans. The actual zoning scheme and zoning regulations for the study area can be consulted in chapter 6 of the BLR. The CCC planning studies underway on the C-BR redevelopment could result in rezoning and change of land-use in the Confluence Area.

The main purpose of the IEM procedure, which was developed in South Africa on the initiation of the Council of the Environment, is to "...resolve or mitigate any negative impacts and to enhance the positive aspects of development proposals" (Dept. of Env. Affairs, Document 1, p.1, 1992).

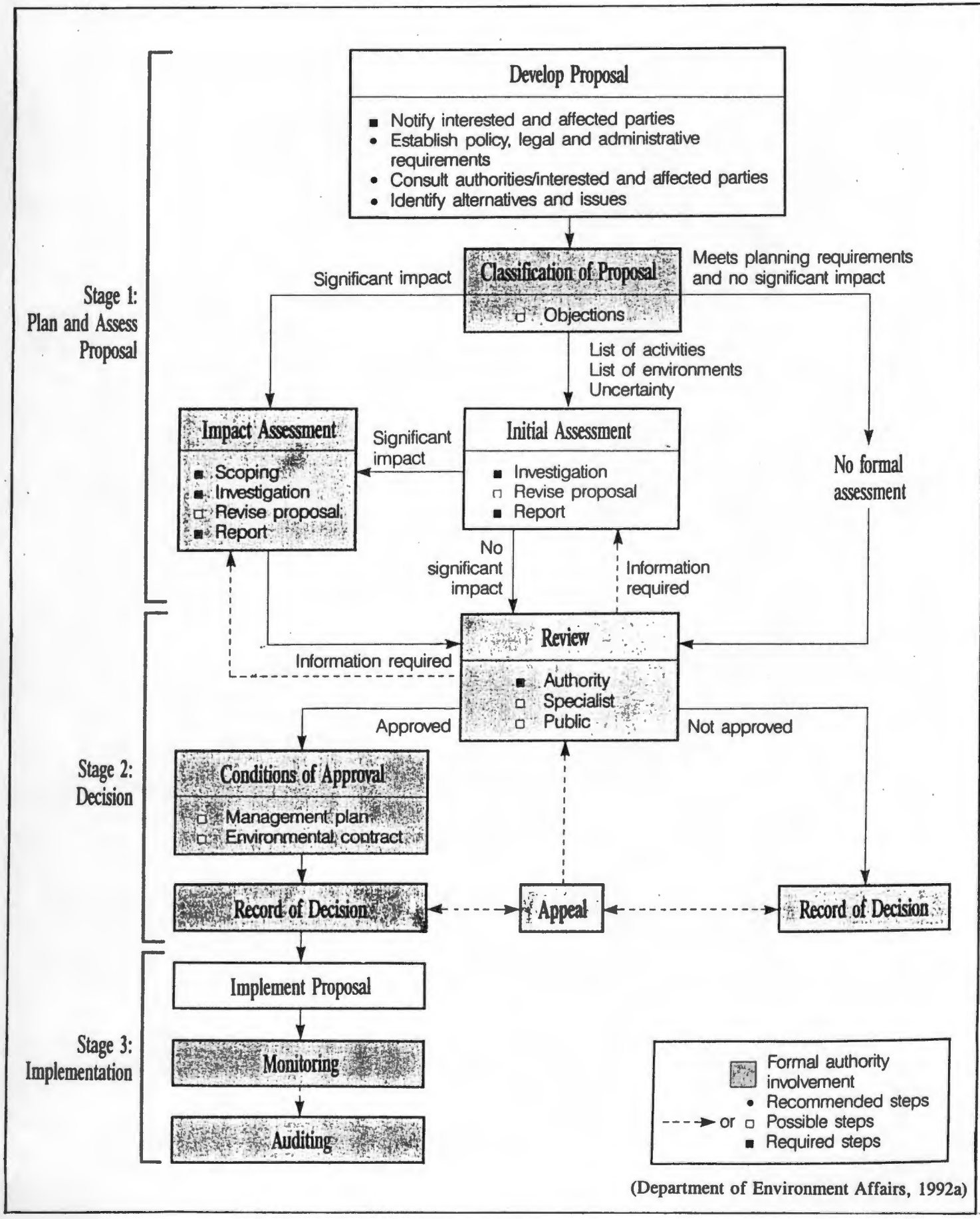
The basic principles that underpin IEM include that there be (Dept. of Env. Affairs, 1992):

* a broad meaning given to the environment (biophysical and socioeconomic).
* accountability for decisions taken
* an open, participatory approach in the planning of proposals
* an attempt to ensure that social costs of development proposals are outweighed by social benefits.
* compliance with these principles during all stages of planning, implementation and decommissioning of proposals (so called "cradle to grave" principle).

Arising out of the "cradle to grave" principle, it is apparent that the IEM procedure encompasses more than environmental evaluation, which is only one aspect of it. The IEM procedure consists of three stages, stage 1: plan and assess proposal, stage 2: decision, and stage 3: implementation (see Figure 3). The assessment phase corresponds essentially with environmental evaluation. The aim of the proposal development phase of stage 1 is to integrate the IEM principles during the planning stage of a proposal (Dept. of Env. Affairs, 1992). With regard to the CCC planning in around the Confluence Area, which could result in a change of zoning in the study area, the proposal development phase forms the central framework or context within which this dissertation is located.

It is noted in the IEM procedure that its implementation with regard to policy and planning proposals should complement and not duplicate existing planning and other procedures (Dept. of Env. Affairs, 1992). Thus this dissertation identifies issues and alternatives, as is recommended in the IEM's the develop proposal phase (see Figure 3), for use by the CCC

# FIGURE 3: THE IEM PROCEDURE




(Department of Environment Affairs, 1992a)

in their planning process. The issues correspond to the identification of key determinants to land-use in the study area (see section 1.2.2). The author is not a land-use planner, so that the recommendations and alternatives presented here are intended rather to inform qualified planners, who can investigate and then model the actual land-use trade-offs. The other recommended proposal development steps are: the establishment of policy, legal and administrative requirements, and consultation with authorities/Interested and Affected Parties (I&APs). These have been undertaken by the MPhil study team and are contained in the BLR. The dissertation also contains an element of EIA in that some recommendations identified contain advice for alleviating, or taking note of impacts, if certain types of developments go ahead.

Provision for IEM is made in the Environmental Conservation Act 73 of 1989, whereby the Environment Minister can issue regulations for the implementation of IEM procedures for certain activities (Fuggle, 1992). Up to now only proposed regulations for comment have been gazetted for environmental impact reports (EIR) (Government Gazette, 1994a) and identified activities requiring an EIR (Government Gazette, 1994b). It is noteworthy that identified activities requiring EIR's include the zoning and rezoning of land. In the interests of better resource decision-making, this dissertation adheres to the principles of IEM and recommends that the developments in the Confluence Area should voluntarily follow the procedure, especially as it may soon in any case be legally enforceable.

## 1.4 Approach and Methodology

### 1.4.1 Approach:

There are two types of approach that are here considered, firstly at the more abstract level ("the way of thinking") and secondly at the practical level ("how to satisfy the aims and objectives"). The abstract level is discussed first.

The context in which the dissertation is located is the IEM procedure, which is used to feed into land-use planning. However, the overall approach implicit in the production of land-use alternatives is within the framework of resource economics, in particular that of sustainable development. Land-use decision-making is a form of resource allocation, where scarcity of land forces choices among competing uses. Sustainable development, a derivative of the

field of environmental economics, is the type of development that meets the needs of the present, without reducing the ability of future generations to meet their needs (Dept. of Env. Affairs, 1993). This criterion of intergenerational equity goes hand in hand with that of efficiency of resource use and the equitable distribution of resources between people. The assets that can be transferred to future generations include cultural assets (capital, knowledge,..) and natural assets (ores, plants, ecological systems,..). A mix of assets should be passed on to future generations as this allows for the use and transformation of assets (Norgaard, 1992). The problem is that some of these assets are non-renewable (eg.minerals) and that other assets are irretrievable if destroyed (eg. wetlands). For this reason biological natural assets should be especially targeted for conservation as they often preserve life-supporting processes (Pearce *et al.*, 1989). The sustainable development approach implicit in this dissertation advocates that the criteria of efficiency, intergenerational and intragenerational equity be strong evaluative yardsticks. The IEM principle of attempting to ensure that the social costs of development proposals be outweighed by the social benefits, embodies the notion of intragenerational equity.

The "practical approach" has to satisfy the overall aim of aiding the decision-maker to undertake more informed planning in the study area with regard to current and future land-use. Overall a landscape planning approach is chosen which forms the basis of the methodology, whereby the "land" has various attributes which are favourable or unfavourable to various human uses. These attributes include its inherent suitability to land-use, its resource potential and susceptibility to hazards (Fabos, 1979). This approach can also be called a land-use capability study where the attributes of the land "determine" which land-uses are inherently suited to it (Naveh and Lieberman, 1984). It was decided to extend/adapt the landscape approach, as the attributes only encompass the biophysical spatial aspects of the study area. The more abstract factors falling under management, procedure of planning and local/regional land-use policy were added to the categories of resources and hazards. This adaptation ensures that the widest possible range of factors that could have a bearing on land-use planning are considered (socioeconomic and biophysical), from site-specific factors to local/regional land-use policy factors. The categories are not "pure" in terms of being opportunities or constraints to land-use, as the constraints to one land-use, may be an opportunity to others. For this reason there is no category of "development suitability", this is subsumed within the other categories.

Since this dissertation is intended to feed into the CCC planning process (proposal development phase), by presenting recommendations for land-use management and a range of land-use alternatives for the decision-maker to consider, the landscape approach is applied in a qualitative manner. The approach needs to be explicit and transparent (not "hide behind numbers") and the decision-maker must be able to follow the reasoning behind judgements made in arriving at land-use alternatives. For this reason, and the broad scale nature required of the analysis, it was decided that the ranking of environmental factors in terms of land-use decision-making should be relatively coarse. The ranking is at two-choice-level, where factors are regarded either as key determinants or they are not. The trade-off between key determinants is also qualitative and those of a spatial nature are not overlaid to produce aggregate ratings. This allows the decision-maker to follow the use of the criteria and the trade-offs made in producing alternatives. Where necessary, factors are mapped together to aid presentation, but overlays as an overall evaluation technique are not used because they cannot adequately deal with non-spatial information and there are difficulties with the weighting of ranked information (Fuggle, 1992).

The recommendations produced for land-use management fall outside of any ranking as they are not directly used in land-use alternatives production. Because of this, the recommendations are at different levels of scale and significance. They are intended to be a practical aid to the decision-maker in managing current and future land-use. There is a relationship between the recommendations and key decision-making criteria in that some of the recommendations are also key criteria, while other recommendations are not significant enough to be key criteria.

A preferred land-use scenario is produced in this dissertation, but this is done with the realisation that it is the author's viewpoint ("personal vision") and does not constitute a qualified land-use plan. It is included to stimulate the thinking of the decision-maker on the area and the possible interpretation of decision-making criteria, and to provide a tangible and practical illustration of the methodology employed.

### 1.4.2 Methodology:

The aims and objectives of the dissertation are fulfilled in a four step procedure.

In step 1, the environmental factors for land-use planning are extracted from the BLR, given a primary screening and the ones retained are classified into categories. The factors extracted embody the total socioeconomic and biophysical context of the Confluence Area. The primary screening entails the dismissal, with reasons, of the factors considered to be of little relevance to land-use planning or management, so as to focus further analysis. This can be seen as a form of scoping (IEM requirement for assessments) without the public participation component. The classification of the selected factors into categories organises the information into the adopted form of the landscape planning approach. The basic division of categories is between site-specific ones (hazards, resources, procedural, management) and the one for local and regional context of policy.

In step 2, the categorised factors are analysed to formulate recommendations for current and future land-use planning, as well as generate key decision-making criteria for producing land-use alternatives. The determination of key criteria requires the analysis/judgement by the author of each environmental factor for significance. "Significance" is difficult to define as there are no objective measures and it thus entails a subjective judgement (Preston *et al.*, 1992). The criteria used to judge on significance of factors as key determinants (or not) include (partially based on Preston *et al.* 1992): the spatial extent of a factor, intensity, risk or probability of occurrence (ecological & public safety), inter- and intragenerational equity, economic efficiency, time, irreversibility, ecological functioning/processes, mitigation potential, legal aspects, precedent, and I&AP views. The I&AP views (ie public input) are an important consideration as they often have specialist input or local insights. In the text of the analysis, the reasons for judging on criteria are given so that the reason for the value judgement is clear.

In step 3, the key local and regional decision-making criteria are first evaluated to produce feasible land-use options. The evaluation consists of comparing the views of the I&APs on the ideal use of the area to the other published policy criteria. The I&APs views are, in effect, used to help establish significance and derive feasible land-use options. Those site-specific criteria which represent spatial constraints to land-use are mapped to aid analysis. Natural land-units are then derived from the analysis of mapped physical constraints to land-use. The land-units are delineated by the most important determining physical factor(s) to aid in a more area-specific discussion of alternatives. The land-use alternatives for the land-units are derived from the evaluation of the feasible land-use options together with the site-specific

and local/regional decision-making criteria. In effect, local/regional criteria and land-use options are compared to the actual site characteristics (opportunities and constraints).

In step 4, a preferred land-use scenario is produced which is based on the personal interpretation of the criteria and the theoretical literature.

## 1.5 Assumptions and Limitations

### 1.5.1 Assumptions:

- The information in the BLR is assumed to be accurate.

- The views of the I&APs presented in the BLR are assumed to be a reasonably representative reflection of the actual spectrum found in the general public.

### 1.5.2 Limitations:

- The dissertation is limited in its analysis and evaluation as it should ideally be performed by a multi-disciplinary team.

- The BLR does contain areas where data was not available such as geotechnical information on soils. This limits the depth of analysis in places.

- The dissertation is constrained by the fact that some studies underway in the area are not completed, especially the Black River hydrology study.

- The extent to which the author can contribute to land-use planning in the Confluence Area is limited by the fact that he is not qualified in town planning.

- This dissertation has to balance the requirements of academic rigour and approach with those of a more "commercial" report format. The format of the dissertation is "hybrid" in places, although emphasis has overall been placed on the academic approach.

- Some of the terminology used for the legal/administrative system has changed, or is in the

process of changing, with the implementation of South Africa's new government structure.

## 1.6 Structure

Prior to Chapter 1 an executive summary of the dissertation is included.

The dissertation itself is divided into five chapters. Chapter 1 contains the introduction which includes the background, aims and objectives, theoretical context, approach and methodology, assumptions and limitations and this section of structure.

Chapter 2 contains the analysis of the BLR to produce recommendations for current and future land-use management as well as local/regional and site-specific key decision-making criteria for the Confluence Area.

In Chapter 3 feasible land-use options are derived from the evaluation of key local/regional decision-making criteria. Natural land-units are then identified from mapped physical constraints in the study area. Finally, the land-use options are compared to the site-specific and local/regional decision-making criteria to produce land-use alternatives for the different land-units.

Chapter 4 outlines a preferred land-use scenario for the Confluence Area. This is done after the proposed regional role of the Confluence Area is discussed with regard to academic theory.

Chapter 5 presents the conclusion by synthesising the major issues identified in the study, comparing the stated aims with the results achieved and by discussing the role of academic theory. Finally, recommendations for consideration by the decision-maker are presented.

# CHAPTER 2 : RECOMMENDATIONS AND KEY DECISION-MAKING CRITERIA FOR LAND-USE PLANNING

This chapter analyses the information presented in the BLR in terms of its relevance to current and future land-use planning. The BLR contains a degree of analysis in the form of summary assessments of all the environmental categories described, but these assessments are only used as guides in this chapter, since they only constitute a relatively superficial, first level analysis.

The first step in the analysis is to extract all the land-use factors found in the BLR. These factors are then firstly subjected to a primary screening to eliminate factors considered irrelevant to land-use planning and secondly classified into categories useful to land-use planning analysis (see Appendix B). These categories make up the broad headings in this chapter and they are: procedural, management, resources (ecological and social), hazards and policy. The policy category is the only one dealing with the local and regional context of the Confluence Area, while the others are site-specific.

For each of the categories the scope and implications for land-use planning are first outlined. The factors belonging to these categories are then individually analysed after a brief factual background is given for each, which is derived from the BLR, unless otherwise referenced. The background serves to highlight the important facts concerning the factors, as in the BLR there is a large amount of peripheral information which tends to obscure the issues. The analysis follows after the factual background and identifies a factor's relevance to land-use planning and discusses problem areas for current and future land-use. Where appropriate, recommendations are formulated to address these problems and key decision-making criteria for land-use are listed. The recommendations are intended to be an "end in themselves" so as to help the planners and managers of the area address the problems that have been found in the course of this study. The key decision-making criteria are used in Chapter 3 to formulate land-use alternatives and trade-offs.

## 2.1 PROCEDURAL

The factors analysed under the heading of "procedural" are those which relate to the system of planning, its processes, manner and legal considerations. The analysis of the procedural factors relevant to the Confluence Area is important to the decision-maker, as they are part of the framework within which the planning process takes place. The five procedural factors discussed are planning, current zoning, current land-ownership, disposal of public land and public participation.

### 2.1.1 Planning

**Factual Background:**

There is a general concern among the I&APs interviewed that the overall planning process in Cape Town is inadequate and inefficient. The I&APs agreed that planning should be more comprehensive, better implemented, there should be more communication between planning departments and the approach should be improved. Specifically, with regard to the Confluence Area, I&APs also felt planning should be improved.

**Analysis:**

The concerns over the planning process in Cape Town may be valid, but they are "structural" problems in planning which are not only specific to the Confluence Area. In essence these concerns revolve around the principle that planning should be comprehensive, holistic and integrated from the planning stage through to the implementation stage. This is in any case central to the IEM process which this dissertation adheres to (see section 1.3).

The I&AP views supporting the issue that planning in the Confluence Area should be improved, also call for holistic planning, where individual projects should not be seen in isolation and that the Confluence Area planning should be linked to the C-BR management plan. These concerns arise out of the fact that I&APs recognise that there is no overall development plan for the study area. The lack of development plan can lead to the approval of individual projects which may be unsuited to the area as there are no specific guidelines against which a project can be evaluated. This was one of the criticisms some I&APs levelled against the UCT Courtyard development. The need for such a development plan is widely recognised and this Confluence land-use planning study was put forward by the CCC

as being useful to their regional planning.

**Recommendations:**

* The Confluence Area requires a holistic, integrated and comprehensive development plan which is linked to planning in the region as a whole.

**Key Decision-Making Criteria:**

* Planning in the study area must adhere to the principles of IEM.

### 2.1.2 Current zoning

**Factual Background:**

There are a wide variety of zoning classes in the study area , but the vast majority of the study area is zoned as Community Facilities Use Zone, within which the medical institutions fall. The medical institutions are VPH, ACRC and VH. The areas zoned as Public Open Space are owned by the CCC and are mainly along the rivers. The north-eastern portion of the study area is mostly zoned as residential (MGV and Berkley Road area), while there are also smaller areas of General Commercial and General Business zoning present in the study area. The area zoned as Community Facilities Use zone, which is by far the dominant zonation, has no specific zoning height restriction as Council permission is required for the erection of buildings. The other zoning categories have variable maximum heights allowed such as the General Business and General Commercial areas (Municipality of Cape Town, 1993). The effectiveness of the zoning of the study area is uncertain as the I&APs had conflicting views about this issue.

**Analysis:**

A zoning scheme is a flexible system because it can be changed when it does not serve the land-owner's and the public's interests. Despite the flexibility, a zoning scheme does confer a set of rights to land-owners once it is in place, resulting in a tendency for a certain land-use to become fixed, unless the land-owner applies for rezoning. For this reason, a zoning scheme has "inertia" and only changes over time if the land-owners so desire. In this regard, the current zoning scheme is an important decision factor in land-use planning as it determines the current land-use and sets precedent for future land-use.

The zoning scheme indicates that the study area is predominantly for public service use with the medical institutions, the SAAO and public open space. The private component of residential, commercial and business use is far smaller. The overall "zoning precedent" is thus public use of the Confluence Area.

The fact that the majority of the Confluence Area has no specific zoning height restrictions is important as the heights of buildings may be a sensitive issue in parts of the study area. The two ridges in the area are fairly prominent and tall buildings may be aesthetically unpleasing in the surrounding context or they may impede other people's views. The buildings currently situated in the Community Facilities Use Zone (eg. institutions) appear to be less than three stories in height (personal observation), which may be due either to CCC control or the cost of building. The height of buildings is important, but it is not considered to be a key decision-making criterion, since no specific building heights can be advocated as this depends on the local situation and surrounding context.

The I&AP comments on zoning in the comprehensive framework of the BLR criticize the zoning process and the current zoning scheme itself. It is likely that most of these concerns are underlain by the fact that the affected public feels it does not have enough input into or is not given sufficient consideration in the zoning process. This is especially evident in the I&AP views on the UCT Courtyard development. It is apparent then that public participation is a vital part of the zoning process and needs to be handled carefully. The municipal zoning regulations state that the Town Clerk must decide the level of public participation on land-use proposals (Municipality of Cape Town, 1993).

**Recommendations:**

* Public participation in the zoning process must be given a high priority.

* The heights of buildings of possible development proposals need to be carefully considered, especially for the application of departures within the zoning process.

**Key Decision-Making Criteria:**

* The current zoning scheme is important as it confers existing rights to land-owners and sets a precedent for future zoning.

### 2.1.3 Current Land-ownership

**Factual background:**

The majority of land in the study area is owned by public institutions, namely the state (SAAO, ACRC, VH) and the CCC. The remainder of land is in private ownership (Berkley Road business and residential areas, MGV) or semi-private ownership (UCT, Transnet & SARCC).

**Analysis:**

Ownership of land imparts a wide range of rights, but the land-owner only has full jurisdiction over his/her land within the bounds set by common law, bye-laws and statutes. The land can only be expropriated by the local authority or state, however, if compensation is paid, an expensive method of land control not commonly resorted to (Claassen and Milton, 1992). Land-ownership is thus a very important factor in the study area and is a strong constraint for land-use planning. It is also narrowly allied to the zoning of the area which also imparts rights to a land-owner in terms of how the land may be used.

**Key Decision-Making Criteria:**

* Current land-ownership is an important constraint to land-use planning as the current land-owners have legal rights over their land.

### 2.1.4 Disposal of Public Land

**Factual Background:**

The I&APs hold conflicting views as to whether public land should be disposed of/privatised and whether Transnet and SARCC land is private or public land. Some I&APs also deem the current method (manner) of public land disposal as problematic. At the time of the collation of the BLR there was a moratorium on public land disposal in Cape Town (*pers. comm.*, G. Wyngaard, 1994).

**Analysis:**

The degree to which land-owners are accountable to the greater social welfare, besides the basic legal requirements (laws), largely depends on whether or not they are publicly funded. As a large proportion of the Confluence Area is owned by publicly funded institutions this

has important implications for the future use of the area. The basic principle put forward by the author is that publicly funded institutions are "owned" by and should be accountable to the public, and should work for the greater good of the public (see section 1.4, discussion of intragenerational equity). Naturally the issue of "greater good" is an abstract one, so that the issue of the disposal of state land will always be controversial and cannot be fully addressed in this dissertation. Public discussion and input, together with that of the state bodies and decision-makers, is needed to clarify the issue.

If it is accepted that state land belongs to the public and should be used for the greater good then this introduces a potential flexibility for land-use in areas of the study area as profit need not be the only motive involved in land-use.

There are conflicting views among the I&APs as to whether Transnet and SARCC are public (state) or private bodies. SARCC regards itself as a public company (*pers. comm.*, M. Callaghan, 1994) while Transnet regards itself as a private company (*pers. comm.*, J. van Dijken, 1994). Some I&APs have pointed out that Transnet has the state as major shareholder and that its assets were originally bought with public funds. This issue cannot be resolved here (needs public discussion), but it has possible implications for the future of the land in the north-western portion of the study area which is owned by Transnet. If Transnet were regarded as a public company then the land need not necessarily be utilised for the greatest monetary profit and it could be, for instance, transferred to the CCC for use as open space or recreation.

The sale of land to UCT and Projection Projects was not conducted under public eyes which has lead to some I&APs expressing concern over the method of land disposal. If there is no open tender call, there is no guarantee that the land is being sold at the highest price or clarity about the motive for the land sale. In the case of the sale of land from Valkenberg to the Medical Research Council, who then sold it to Projection Projects, even the hospital administration was not consulted on the "second sale" (*pers. comm.* C. Dare). If public land is disposed of, it should be motivated with reasons, it should be a transparent process and somebody should be held accountable, thus ensuring that public interests are adequately served.

Public land has strategic value for land-use planning in Cape Town as it is often large in size

and could be used to address social imbalances from the past (see section 2.6.1.4). If the land is sold off piece-meal to private developers then this opportunity is lost. The moratorium on the disposal of state land addresses this, although with new local government and public participation the land disposal could resume.

**Recommendations:**

* If public land is sold in the study area it should be by tender call, be motivated, transparent and accountable.

* Public land has strategic value and its use should be evaluated against the greater good of society (eg. to address social imbalances).

**Key Decision-Making Criteria:**

* Publicly owned land may be more flexible to change in land-use which addresses the needs of the general public in comparison to private land.

* Whether or not Transnet is regarded as a public or private body has implications for land-use in the Liesbeeck Sportsgrounds area.

### 2.1.5 Public Participation

**Factual Background:**

There is a strong view among I&APs that there is a need for improved public participation in decision-making in the Confluence Area. The I&APs identified local and regional organisations as having an interest in the study area.

**Analysis:**

IEM has as one of its main principles that public participation is crucial in environmental management (Dept. of Env. Affairs, 1992). The need for improved public participation in the planning process is one that reoccurs frequently in the I&AP comments regarding, for example, zoning issues, river management and the UCT Courtyard development. There appears to be a feeling that up to now that I&APs have generally been omitted out of the planning process, resulting in developments, such as that of UCT, creating a strong public protest as witnessed in the media. Any planning will be met with distrust if it is done in

secrecy even if it really is in everyone's best interests. People have a psychological need to be consulted and they can also contribute to and enrich the planning process as they are the ones who will be affected in the end. In the Confluence Area, because of its strategic location close to the city and open space character, there are local and regional I&APs who have a stake in the future of the area. Future planning in the Confluence area should take cognisance of this need for improved public participation.

**Recommendations:**

* Public participation should be a high priority in the planning and management of land-use.

**Key Decision-Making Criteria:**

* The views of local and regional I&APs must be taken account of in land-use planning.

## 2.2 MANAGEMENT

The factors analysed under "management" are those relating to the maintenance of the study area by the CCC or other public bodies. Management factors are important to land-use planning decision-makers as they entail a capital outlay and impact on the land-use options available in the study area. The factors analysed in this section are road widening and the proposed Malta-Berkley Road Link (fall under the subheading of traffic flow), and security.

### 2.2.1 Traffic Flow

#### 2.2.1.1 Road Widening

**Factual Background:**

Within the study area the Liesbeeck Parkway and Berkley Road have road reserves to cater for future demand and expansion of the road system. The CCC planning also has a proposal for widening the Liesbeeck Parkway, requiring the infilling of the old Liesbeeck River course. There is little finance available for the alteration of the road system at present and hence there are no immediate plans with respect to road widening. With regard to the Liesbeeck Parkway proposal, the upgrading of the Observatory Road and Liesbeeck Parkway intersection could possibly offset the need for the road widening (*pers. comm.* P. Clark).

**Analysis:**

The Confluence Area is an important traffic link in Metropolitan Cape Town, the Black River and Liesbeeck Parkway and Settler's Way serve regional needs. Although there are no immediate plans at present to implement road widening this is likely to occur in the future with Cape Town's population growth and especially if densification of the city is taking place. If the C-BR area is densely developed this could also increase the traffic demand on the Confluence Area. Thus the areas demarcated as road reserves by the authorities and the roads themselves can be seen as important immovable constraints ("fixes") in land-use planning.

If the Liesbeeck Parkway were indeed to be widened it would first require a detailed study of the hydrology of the study area to determine the role of the old water course for flood control. There would also be ecological impacts which would need to be evaluated.

Any road widening in the study area would increase the noise impacts on the study area as firstly ,the traffic flow speed might increase and secondly, the cars would be closer to people living in the area. If road widening does take place, mitigatory measures may have to be investigated to alleviate noise impacts on residents in the area (see section 2.5.2.2).

**Recommendations:**

* The proposed Liesbeeck Parkway widening, if undertaken, would first require a detailed investigation to determine whether it is desirable in the light of the hydrological and ecological aspects of the area.

* If road-widening were to take place in the Confluence Area, then the increased impact of noise pollution and possible mitigatory measures may need to be considered.

**Key Decision-Making Criteria:**

* The demarcated road reserves for road widening are an important land-use planning determinant which restricts other land-use.

### 2.2.1.2 Proposed Malta-Berkley Road Link:

**Factual Background:**

There is an identified need for a through road from Maitland to Observatory, the proposed Malta-Berkley Road link, which would enhance regional traffic flow across the study area. Aberman (1993a) recommends that the scheme be reviewed as part of the C-BR Contextual Framework study and comments that it is bigger than necessary. The proposal was initially put forward in 1945 and a road reserve running between the SARCC/Transnet and the Transnet owned land is demarcated by the CCC on the zoning map for the area. This road reserve is not the only possible alignment for the link as it could be routed further north through the C-BR area. At present the link is too expensive to build.

**Analysis:**

Although there is the need for the proposed Malta-Berkley Road link, it has been demarcated as a road reserve for over 50 years and has not been implemented. It appears as if financial constraints prevent its implementation and that the whole proposal and alignment could be revised with the planning for the redevelopment of the C-BR area. Until the road link reserve is deproclaimed, however, it remains a restriction on land-use in the northern Confluence Area, ie it is a key decision-making criterion.

If the road link is implemented it would impact hydrologically and ecologically on the cut-off portion of the Liesbeeck River Course, the Black River and increase noise levels in the northern Confluence Area, including the RBS. The link would totally enclose the study area with roads. The link, if seriously contemplated, would need a thorough needs and desirability study, an alignment study, in conjunction with an EIA.

**Recommendations:**

* If the proposed Malta-Berkley Road link were seriously contemplated a needs and desirability study and an alignment study would need to be undertaken in conjunction with an EIA.

**Key Decision-Making Criteria:**

* The proposed Malta-Berkley Road link's road reserve is an important restriction on other land-use within that reserve.

### 2.2.2 Security

**Factual Background:**

Observatory and Woodstock in general have higher crime rates than the Confluence Area with regard to car theft and housebreaking. Despite this, there are conflicting views among the I&APs as to whether security is a problem in the Confluence Area.

**Analysis:**

The apparently low crime rate for possessions (cars, houses) in the study area is likely due to the nature of current land-use. The institutional grounds which make up a large part of the study area, are generally closed to the casual public and have their own security guards. These areas would not be attractive to petty crime on the whole and lower the overall crime statistics.

Despite the low crime rate for property, there is a perceived security problem in the area which is evident from some of the I&AP's comments in the comprehensive framework of the BLR. This perception probably relates to the western-half of the study area where there have apparently been some attacks on people, there are vagrants, there are mental patients and the area has a run-down feel; these are all factors that can contribute to a feeling of unease amongst the public as regards personal safety. Perception of safety is only partially based on facts, as people are seldom fully informed, and thus the overall subjective impression plays an important role. Faced with a complex environment, people resort to cognitive over-simplifications, or biases, to gain a measure of control (Miller, 1985). For instance, if the area does become more developed and accessible to the general public, the actual crime figures may increase, although the safety perception of the area may improve if there are more people present in the area. This is more likely to be the case in the western-half of the Confluence Area. On the eastern side of the Black River there is already a fair amount of pedestrian traffic along Alexander Road, in MGV and in the residential/commercial sector to the south of Berkley Road. The western side of the Black River has little pedestrian traffic and this can probably be ascribed to the barrier affect of the road system and the general lack of public facilities beyond those of the institutions. This area could benefit security-wise, if development would occur that increases people traffic in the area.

Security is largely a management problem that can be addressed through better policing and

vigilance of the current land-users. Since the Confluence Area does not appear to have an unusual crime problem in comparison to the neighbouring suburbs at present, it is not a key decision-making criterion. Nevertheless, it is recommended that policing in the western-half be stepped up to encourage recreational use of the area.

**Recommendations:**

* If development takes place in the study area which increases public access, then security management would need to be stepped up.

* Visible policing in the western-half of the Confluence Area needs to be increased to encourage people to use the area recreationally.

## 2.3 ECOLOGICAL RESOURCES

Factors analysed under ecological resources are those aspects of the biological environment in the Confluence Area which are important to conservation and the maintenance of ecological systems. Ecological resources are important to land-use planning and decision-making in that they are environmental assets which are largely irretrievable if lost. The factors analysed in this section are wetlands and aquatic avifauna.

### 2.3.1 Wetlands

**Factual Background:**

The wetlands cover approximately 30 ha of the study area and they have the highest proportion of indigenous species in the area, especially Raapenberg North (38 species in total). They are the areas of greatest conservation significance within the study site as the other vegetation is predominantly alien. The Confluence Area wetlands remaining today are a small remnant of a larger system which once linked up with Rietvlei through Paardon Eiland. Current threats to the wetlands are mainly alien species encroachment and the proposed widening of the Black River.

**Analysis:**

Wetlands are of the most threatened of all ecosystems as their habitat is restricted to only a small portion of the landscape and they usually occur on flat ground where development can

easily occur after infilling. From a historical perspective, the Confluence Area wetlands are very important as they are a remnant of what was once there and fulfil a role as refuge for remaining species.

The wetlands in the study area are not pristine and do not support a high number of plant species, but they do provide refuge to a diverse avifauna. The wetlands also fulfil an important role in river morphology and dynamics with regard to sedimentation, water quality and bank stability. Taking into account the history of the area, the birds that wetlands support and the physical/hydrological role that the wetlands perform, these areas are an important part of the biophysical system which should be conserved. A large part of the wetlands fall within the RBS, but this affords them relatively little protection, since this sanctuary is owned by the CCC and can be deproclaimed (Peterson and Bellas, 1987). Some of the management money for the sanctuary is used for alien control.

The future of the wetlands in the Confluence Area is tied to the hydrological management of the Liesbeeck and Black River systems, ie flood control. The wetlands and the functions that they fulfil should be an important decision factor in the planning and implementation of a hydrological strategy for the rivers.

There is a potential for rehabilitating wetlands in the study area. The CCC does have plans, but no money to reinstate the wetland which is at present a lawn covered picnic area abutting the remaining Rosenfontein wetland (*pers. comm.*, J. Gardiner, 1994). Nevertheless, these plans should not be dropped as, according to Turpie (1994), it would provide additional waterbird habitat and help purify water. At present the picnic area has no facilities (eg. concrete table and chairs, toilets, personal observation) so that its utility is doubtful.

**Recommendations:**

* Alien vegetation in the wetlands must continue to be controlled.

* The Rosenfontein wetland should be fully reinstated.

* The hydrological planning of the rivers needs to take strong account of the important nature and function of the wetlands.

* Any proposed development in the study area should consider the possible impact on the wetlands.

**Key Decision-Making Criteria:**

* The wetlands in the Confluence Area should be conserved as an ecological resource.

### 2.3.2 Aquatic Avifauna

**Factual background:**

The RBS is a sanctuary proclaimed by the CCC in 1986 and covers about 10ha (not 15.2 as stated in the BLR)(Peterson & Bellas, 1987). The Confluence Area has rich aquatic avifaunal diversity (102 species, 60% of the Western Cape total and 3 red data book species), but not too many species breed in area (possibly 32). Yet, it may also be an important stop-over point for birds travelling between the northern and southern wetlands of the Cape Metropolitan Area (CMA) to gather and feed there. Habitat alteration has lowered the population numbers of some of the aquatic bird species in the Confluence Area since the 1960's.

**Analysis:**

The future of the aquatic avifauna in the study area is strongly tied to that of the wetlands which are under threat (see section 2.3.1). The low numbers of breeding species in the area is likely to be due to the ecologically degraded nature of the area (water pollution, alien plant species, lack of suitable habitat, etc). Even if the area is not an important breeding site its role as stop-over point is likely to be of value in sustaining the waterbird populations. The area must be seen in its regional context as one of a series of wetland remnants that support bird life. From a conservation point of view the aquatic avifauna is an important ecological resource that needs to be conserved and considered in land-use planning. The birds are also of value as a recreational resource for the public even though the area is not greatly visited at present.

**Recommendations:**

* Any possible development in the Confluence Area should consider possible impacts on the aquatic bird populations.

**Key Decision-Making Criteria:**

* The aquatic avifauna is an important ecological resource that needs to be conserved and it is dependant on the future of the wetlands.

## 2.4 SOCIAL RESOURCES

Social resources encompass those social factors within the Confluence Area of value to, or providing a service, to the local area or Cape Town at large. The social resources are important to land-use planning because if they are lost, impaired or need to be provided, society will entail a cost. Depending on the factor this may be a monetary, cultural or quality of life cost. The factors analysed fall under three subheadings of historical/cultural, current land-use and infrastructural. Historical/cultural includes the factors of National Monuments and archaeological sites; current land-use includes recreation, employment, services and land value; and infrastructural includes transport network, sewerage, and electricity.

### 2.4.1 Historical/Cultural

#### 2.4.1.1 National Monuments

**Factual Background:**

Four declared National Monuments are present in the study area, namely the Valkenberg Homestead, Nieuwe Molen Mill, Main Building at SAAO, Main Administration Buildings at VH. There are four other declared National Monuments in the immediate vicinity of study area: Koornhoop, Westoe, Moelenvliet and Bellevliet. Besides the National Monuments, there are other buildings in the Confluence Area older than 50 years which require National Monuments Council permission for destruction. There is general agreement among the I&APs that the historical features in the area should be conserved.

**Analysis:**

The study area is of strong cultural/historical importance with regard to National Monuments. Hence the monuments make up an important social resource that needs to be conserved. Historical buildings and history in general give people a sense of place, identity and feeling of time. The monuments in the study area are not only important for the people of Cape

Town culturally, but they could also be of tourist potential as part of scenic walks. Accessibility to these historical buildings is a problem because of the security arrangements of the institutions. This is an issue that needs to be addressed.

**Recommendations:**

* The declared National Monuments must be conserved in the Confluence Area.

* The National Monuments should be made more accessible to the public and to tourists.

**Key Decision-Making Criteria:**

* The declared National Monuments must be conserved as a social resource.

**2.4.1.2 Archaeological Sites:**

**Factual Background:**

Relatively little archaeological investigation has been done in the study area except for the work on the old Valkenberg Homestead. The Homestead is deemed an important archaeological site and it was recommended by UCT archaeologists that the UCT Courtyard development have an archaeologist on the construction site. Other sites of archaeological interest in the Confluence Area are likely to be found in the precincts of old farms, around the old mill sites, the redoubts and the original Meridian Beacons of the Observatory. The exact location of many of these sites is not precisely known and for this reason the whole of the study area needs to be subjected to a historical investigation. The area may have Stone Age sites located on it because of its local location (ridges), but no evidence has been uncovered as yet.

**Analysis:**

The possibility of Stone Age sites is interesting but until there is concrete evidence it cannot be considered an important factor. The area does have other archaeological potential with regard to more recent history, but the lack of knowledge of exact location of sites is a major stumbling block. Therefore a study is needed to identify such sites.

Despite the archaeological potential of the area, archaeology cannot be considered a key decision-making criterion for land-use planning because of the locational uncertainty of the

sites and the fact that they occupy small point localities. These can be accommodated for at the development planning level when an EIA is undertaken for specific development proposals. These sites do not influence the broad or overall suitability patterns for land-use planning to any great extent. But, should development occur in the area, then vigilance for archaeological finds should be maintained.

**Recommendations:**

* A historical and archaeological investigation should be undertaken to attempt to pinpoint sites of interest, so that these can be sensitively dealt with if development takes place.

* If any development occurs in the study area the possibility of archaeological finds must be assessed and taken into account.

### 2.4.2 Current Land-Use

#### 2.4.2.1 Recreation

**Factual Background:**

The study area itself has few functioning public recreation facilities except for two golf driving ranges, while the Institutions own a number of "private" facilities. In the past the Transnet sports facilities provided for tennis, bowls and sportsfields, but these were closed due to the lack of patronage. Limited jogging and walking takes place in the area and the rivers themselves are only used for fishing and bird-watching to a small degree. The Liesbeeck walkway is likely to be extended into the study area. There are also a variety of public recreational facilities adjacent to the western boundary of the study area which provide for hockey, bowls and swimming.

**Analysis:**

If the sports facilities adjacent to the Confluence Area are excluded, then the study area has very little to offer at present for recreation, in terms of active recreation facilities or passive recreation activity. In this dissertation active recreation is defined as that involving hard exercise (requiring sports facilities) and passive recreation that of open air activity for leisure (requires walk/cycleways, parks, etc)(Scarr, 1989). The study area is thus recreationally underutilised and the closure of the Transnet facilities is a case in point.

Active recreation facilities do appear to be sufficiently provided with regard to the adjacent facilities, at least for the local area, so that the use of the study area could focus on passive recreation. The potential and future of passive recreation in the area depends largely on the future water quality of the rivers as well as perceived security risk. Access is also a problem as the land-owners do not want people moving through their property. Despite these difficulties the area does presents a recreational opportunity and the I&APs consulted did support the improving of facilities in the area.

**Recommendations:**

* The institutional land should be made more accessible to the public for recreation purposes.

**Key Decision-Making Criteria:**

* The study area has a large potential for recreation (especially passive) which is underutilised at present due to the degraded nature of the area.

**2.4.2.2 Employment**

**Factual Background:**

The VH, ACRC, VPH and the SAAO employ between 1905-1945 people (855, 660-700, 350, 40 respectively). Other employment that is likely in the study area, but where there are no data are the CCC (maintenance of area), the golf driving ranges, the commercial area near Berkley Road, the Rosedale Coffee Shop, the UCT Courtyard development, and casual and domestic labour. In an interview the representative for MGV expressed concern over the need for employment by that community. The areas in and around the C-BR and Confluence Area support a largely homogeneous lower to middle income population.

**Analysis:**

The medical institutions and the SAAO are likely to provide the bulk of the total employment in the study area while the Berkley road commercial area and the CCC are likely to be large employers as well. The construction at the UCT Courtyard development will provide a number of long term jobs and an even larger number of short term jobs in the construction phase.

Compared to a more densely developed area in the city with a residential/commercial mix,

the study area is shown to have a lower level of employment. The importance of employment locally is difficult to evaluate as it is really a regional problem that needs to be addressed at a policy level. For instance the people in MGV may not benefit from local development as the skills required may not be present. Employment is not a site-specific key decision-making criterion because of its regional nature, but it is addressed under local/regional factors (see section 2.6). No recommendations for employment are formulated.

### 2.4.2.3 Public Services

**Factual Background:**

The main public services provided in the study area are medical (VH, VPH, ACRC) and scientific (SAAO). VH, a public hospital, provides primary health care, forensic, psycho-geriatric and neurological (clinic) services. VPH, a private hospital, provides frail care and surgical services and a houses a creche. ACRC, a public institution, houses congenitally retarded and brain damaged patients and has creche and primary school attached to it. The SAAO undertakes research and astronomical data processing for Sutherland Observatory. The institutions have been providing these services for a considerable time in the area, in the order of decades. Many I&APs expressed the view that VH, ACRC and SAAO could be relocated to another area or rationalised.

**Analysis:**

The medical services provided are of local and regional (Cape Metropolitan Area) importance while the SAAO is of regional and national importance. The study area is thus an important location for these specialist services in Cape Town and are of great benefit to its citizens. The services have, in the way they use the land, historically given the area its character of open space.

The current institutions have historically been in the area and they legally own the land. In terms of land-use planning therefore they cannot be prescribed to in terms of relocation or rationalization. Any planning, however, must take into account the possible relocation of the institutions or the sale of parts of their land (ie have a policy). None of the administrative heads of the institutions interviewed as I&APs expressed the knowledge of any plans for the possible relocation of their institutions. There is room for rationalization and this could be

investigated by the institutions to optimise their own functions and that of the surrounding land-use.

The institutions are among the largest land-owners in the study area so that their current land-use is an important factor for land-use planning. The possible release of land from the institutions (eg. by rationalization) is also a key decision-making criterion as this has already occurred at VH (UCT and Gateway Park purchases).

**Recommendations:**

* The institutions in the study area should investigate their use of the land and rationalize, ie release under-utilised land, where necessary.

**Key Decision-Making Criteria:**

* The current land-use of the institutions is an important consideration as they have legal and historical rights to the Confluence Area. The institutions fulfil important local and regional functions.

* The institutions in the study area could rationalize their land-use and release land for other purposes.

### 2.4.2.4 Land Value

**Factual background:**

The average price of non-residential land in Paardon Eiland-Ndabeni ranges from R90 to R488 per square metre. The average price of residential land in Observatory (with structure) is R157 250 and lower Woodstock R101 000. Figures for the Confluence Area are not available, although 2.4ha of land was sold to UCT for R1000 000 (probably below market value).

**Analysis:**

The "expensiveness" of the study area land is difficult to gauge as it is largely relative. It depends on the comparison with other areas and the kind of land-use to which it is put. Nevertheless, it can be said that the land value is high, due to the built up nature of the Confluence Area's surrounding suburbs and it's location close to the CBD. High land value

is an important decision-making criterion as it constrains some land-use alternatives.

**Key Decision-Making Criteria:**

* High land value in the Confluence Area is an important criterion as it constrains land-use alternatives.

### 2.4.3 Infrastructural Resources

#### 2.4.3.1 Transport Network

**Factual Background:**

Liesbeeck and Black River Parkway, Settler's Way and the rail bridge in the northern Confluence Area edge over the Black River are part of the metropolitan road network and represent a large public investment. Berkley Road, Observatory Road and Alexandra Road are larger local/regional roads while the remaining road network is small. Within the study area the only east-west link is the Valkenberg Hospital road bridge and the footbridge from Alexandra Hospital to the SAAO. Both of these are for institutional use (private) but members of the public do cross them by foot. The CCC C-BR report (Aberman, 1993b) states that the study area presents an opportunity for cycleways and footpaths.

**Analysis:**

The Parkways, Settler's Way, Berkley Road and Alexandra Road can be considered as large scale fixes to land-use as they represent substantial social investment and they are totally integrated with the remaining road network.

Locally there does not appear to be a need for a another east-west road/pedestrian link as the areas on both side of the Black River area used predominantly by the institutions. Regionally there is the proposal of the east-west Malta-Berkley Road link (see section 2.2.1.2).

Footpaths and cycleways could be quite easily accommodated in the study area as they do not require a great deal of space and they could be negotiated with the land-owners.

**Recommendations:**

* Footpaths for jogging and walking and cycleways should be implemented in the Confluence

Area.

**Key Decision-Making Criteria:**

* The Liesbeeck and Black River Parkway, Settler's Way, Berkley Road, Alexandra Road and the railway bridge are important infrastructural resources and immovable constraints to land-use planning.

### 2.4.3.2 Sewerage

**Factual Background:**

If the C-BR area does not undergo large scale redevelopment and the study area does, then the upgrading of the sewerage system in the Confluence Area could be problematic in terms of expense (reticulation and purification upgrading). There is a sewerage reticulation problem at present with stormwater entering the drains, causing the sewage to overflow near the Rosenfontein wetland.

**Analysis:**

Even in the unlikely event that the C-BR area is not redeveloped, then a newer sewerage reticulation and treatment system would be more of an economic than a technical obstacle. However, there is no information available as to the actual costs. It is highly unlikely that the C-BR area will not be redeveloped (CCC contextual reports on the C-BR point to this), so that an upgraded sewerage system will have to be provided for the C-BR area. The Confluence Area can "tap" into this if itself were further developed. The sewerage system is thus not a key decision-making criterion.

The spillage of raw sewage into the Black River at times during the winter, indicates the system is not efficient at present and needs to be improved. Raw sewage has ecological and human health risks, although the threat is reduced in that the spillage is likely to occur during high river flow which will dilute it.

**Recommendations:**

* The sewage overflow near the Rosenfontein wetland needs to be addressed.

#### 2.4.3.3 Electricity

**Factual Background:**

The study area is adequately supplied with electricity at present and an expansion of service, if need be, could be undertaken without undue difficulty. On the eastern bank of the Black River between the railway bridge in the north and the SAAO/VH boundary in the south, there are two extra high voltage cables. These would be very expensive to move (millions of rands) and it would disrupt the power supply to Observatory.

**Analysis:**

The probable cost of moving the cables is high so that they can be considered an immovable constraint to land-use planning. The exact location of the cables is not indicated in the BLR infrastructure map, but it is described as running along the eastern bank of the Black River. It extends, at a set distance from the Black River Parkway, from the railbridge in the north, to the SAAO and VH boundary in the south.

**Key Decision-Making Criteria:**

* The two extra high voltage cables on the eastern bank of the Black River can be considered an immovable constraint.

## 2.5 HAZARDS

The factors included under "hazards" are physical in nature and they may present a threat or constraint to property, or human health. These factors are important to land-use planning as they can provide spatial patterns of constraints, and often risk, to different type of land-use. This section is divided into three subheadings of rivers, atmosphere and terrestrial. The factors for rivers are flooding and water quality; for atmosphere, air and noise pollution; and for terrestrial, pollution and substrate stability.

### 2.5.1 Rivers

#### 2.5.1.1 Flooding

**Factual Background:**

At present both the Black and Liesbeeck rivers flood in winter during peak rainfall periods. The river systems cannot be considered wholly natural any more as they have been extensively modified by humans through canalisation, channelisation, rerouting, widening, draining of wetlands, the alteration of catchment characteristics and input of sewage. The rivers are part of the urban system in that they act as stormwater outlets and treated-sewage outlets.

The river flow volume has been and is increasing due to catchment hardening, thereby increasing flood risk in the lower reaches of the rivers. For the Black River, the calculated 1:50 year floodline for the present time includes a large portion of the Confluence Area and stands at 4.6m above sea level (asl). With hardening of the catchment, the 1:50 year flood level is expected to rise to 5.1m asl. At present a study commissioned by the CCC on the hydrology of the Black river is underway and different options for flood control are being investigated. Flood control measures elicit controversy among the I&APs as the planned river widening of the Black River is viewed as ecologically insensitive and threatens the RBS. The proposed river widening, which is on hold until the completion of the hydrology study, has been planned to increase the Black River to 121.9m from the current 45.7m. A constraint to possible flood control is the very small gradient the study area has to the sea - a deepening of the river channel will thus not increase the volume of outflow greatly. There appear to be two broad camps of opposing viewpoints surrounding flood control measures, namely those supporting what can be called "soft" engineering and others "hard" engineering. Soft engineering, which is held to be more ecologically sensitive, requires more land (eg. flood retention ponds) than hard engineering which entails channelising and canalising. Mr M. Lief, Chief Engineer of CCC Drainage, estimates 200ha of land is needed to accommodate current and future flood control needs if the flood retention method is used (*pers. comm.*, M. Lief, 1994).

Management of the greater Black River system is hampered by the fact that part of its catchment falls outside of the jurisdiction of the CCC. River management is ongoing for the

Black and Liesbeeck rivers, in the form of weed and sediment removal on an annual basis for flood control.

**Analysis:**

There are a number of principles related to river systems that have a strong bearing on the management of them. Firstly, the most important point about rivers is that they are dynamic systems, responding to various, often inter-related, environmental variables. Their flow volume responds to precipitation (intensity, duration, frequency) and catchment characteristics (infiltration capacities, catchment shape) (Ward, 1975), while their channel morphology responds to factors including sediment (size, quantity), flow (volume, speed) and substrate (geology) characteristics, and gradient (Summerfield, 1991). This complexity of variables makes the task of predicting and managing for river systems difficult as the outcome of actions is not always directly apparent. Secondly, rivers are linear systems which means that all changes in the system are transmitted down the system and increase in intensity, for example sediment and water volume. The implication of this for management is that a management problem cannot be solved at a single location without considering the whole system. Thirdly, flooding may be a problem when it conflicts with human interests, but it is a natural phenomenon and low lying areas (floodplains) are the outlet for increased water volume during high rainfall periods. Low-lying areas will thus always be at risk from inundation.

The linear nature of rivers means the problems of flooding in the Confluence Area cannot be addressed only at this site. Integrated catchment management (ICM) is needed for the Black and Liesbeeck rivers where the different municipalities that have jurisdiction over different parts of the rivers coordinate their management strategy. The need for an ICM is strongly supported by the I&APs and the CCC is aware that this is needed as well. The CCC commissioned study on the Black River system's hydrology should facilitate ICM as more information on the extent of the problem and the possible solutions will be available. The ICM could be undertaken by the proposed Metropolitan local authority or a dedicated joint river management body instituted by the municipalities. Aspects that need to be investigated include flood return intervals, the type of development in the catchments (% impermeable surfaces), on-site run-off retention on properties, storm water routing, public run-off retention ponds and flood control measures and strategy.

Public participation is needed in evaluating flood control options. This arises out of the concerns of the I&APs that not enough public input is occurring and the controversial nature of the flood control options with regard to environmental impacts. Public input can specifically help evaluate trade-offs that have to be made between hydrological, developmental and ecological needs with regard to the various flood control options. The decision-maker needs the social weighting of different environmental components to make a decision on trade-offs which affect the environment and the public in different ways. In the Confluence Area this is especially evident as the "soft" and "hard" river management/engineering camps are strongly opposed to each other.

In urban areas, information on the flood frequency or return interval of different sized flood events is crucial. The following discussion on the calculation of flood return intervals is based on the interpretation of books on hydrology by Ward (1975) and Shaw (1988). There are various methods of calculating return intervals, but they all entail the statistical analysis of historically measured run-off or precipitation data which means probability of occurrence is used. The run-off can be estimated for a catchment at a given point using rainfall data and catchment characteristics, but this may be less accurate than using actual measured river discharge data. The accuracy of the return interval prediction is dependant on the type of data available, the length of the record of the data and its representativeness of the area being sampled or targeted. The calculation of return intervals is complicated in urban areas by the fact that the river discharge pattern (storm hydrograph) changes with increased catchment hardening. Past data alone is therefore inadequate and the effect of catchment hardening has to be "modelled in" to recalculate floodlines in the future. The possibility of global warming also complicates the prediction of flood return intervals as the past data on rainfall characteristics (frequency, duration, intensity) and climate may not hold to be true for the future (Schulze, 1990). The implication of the preceding discussion is that the calculated 1:50 year floodline, which includes the effects of total catchment hardening, is a "best estimate" with a partially unknown level of uncertainty attached to it. The implication of this for land-use planning decision-making is that the acceptance of a flood return interval includes an element of risk. Land-use planning in flood risk areas should therefore be cautious in nature and allow a margin for uncertainty.

Wiseman and Sowman (1991) critically analyse the legal and administrative river system management framework in South Africa and conclude that this framework is inadequate.

There are no statutory or administrative provisions that allow ICM to be implemented or that address the maintenance of a river's ecological integrity adequately. From the Wiseman and Sowman paper (1991) it can be seen that the legislation relating to floodlines is not comprehensive and it is only referred to in LUPO and the Water Act 54 of 1956 (hereinafter the "Water Act"). The Water Act compels local authorities to delineate 1:20 year floodlines on township plans, but if approved structure plans exist, then the authority can permit development within this area. Under LUPO the legislation is similar, authorities may not consider rezoning of land within the 1:50 year floodline (but the Administrator can), unless an approved structure plan exists. The preparation of sound structure plans is therefore crucial, but unfortunately LUPO itself does not mention river catchments or stormwater management. The Cape Provincial Administration has a policy of requiring the inclusion of 1:50 year floodlines on rezoning and sub-division applications, but local authorities, including the CCC, are not obliged to adhere to this (Wiseman and Sowman, 1991). The Council for the Environment (1989) recommends that structure plans should include certain development restrictions within the 1:50 year floodline. Overall there is thus a trend within legislation and policy of towards using the 1:50 year floodline as an indicator where development is at risk, although this is not legislatively powerful or specifically defined. On the weight of this trend, the 1:50 year floodline is adopted for the Confluence Area as the "planning norm" for flooding and development.

Nevertheless, the norm of the 1:50 year interval is a pragmatic one. The acceptance of a lower interval limit (eg.1:15) means damage to life and property will occur fairly frequently on average, which most people are not prepared to accept. The acceptance of a high return interval (eg 1:100) would render large areas of land largely unusable for long periods of time when there is no flooding. But even the acceptance of a 1:50 year interval does not guarantee that such a flood might not occur for example twice within a period of 10 years, as the 1:50 is an *average* return interval.

To minimise social losses (infrastructural investment and human life), land-use within the 1:50 year line should be used for purposes not irreversibly impacted upon by flooding such as conservation, golf courses, picnic areas etc. This is the ideal, but the 1:50 floodline (5.1m asl, includes catchment hardening) does extend into a part of the densely built area of Observatory, which means some form of flood control measures are needed. It must also be noted that within the study area itself the area of the 1:50 year line only covers a

marginally greater area than the 1:20 year floodline (see BLR, Map 2). Even if the proposed river widening were to take place and reduce the area covered by the 1:50 floodline, it is felt that the present area within the catchment hardening inclusive 1:50 year floodline (5.1m asl) is the one which should have restricted development. This is because of the large extent of the 1:20 year floodline, the inherent uncertainty of the floodline predictions, possible global warming induced change in rainfall characteristics and sea level rise. Sea levels are currently rising in South Africa and they are predicted to increase by approximately 20cm in the next 40 years and possibly by as much as 100cm by the end of the next century (Hughes *et al.*, 1991). This reduces the Confluence Area river-to-sea gradient further, thereby increasing flooding risk. Another reason for using the 1:50 year (5.1m asl) line is that the northern Confluence Area has historically been a floodplain and wetland and will always be a high risk area, even with flood control measures. The area has a naturally high water table that also presents difficulties for some types of land-use (eg. foundations for buildings). This position of retaining the 1:50 year (5.1m asl) floodline as development restriction area should be reviewed to consider possible expansion of it once the CCC hydrological study provides more accurate information on some of the relevant parameters.

The river systems themselves are irretrievably altered and they are in the context of an urban area where flood control is important. For this reason the current river management actions of weed clearance and dredging need to be maintained even though they have ecological impacts. The need for dredging may decrease over time as the catchments are hardened by development, exposing less soil area to erosion. The weeds are aliens that threaten indigenous aquatic ecosystems so that control is essential. The weed problem will remain as nutrient levels in the rivers are always likely to be above that of the natural state (sewage input etc). Weed clearance needs to be done with circumspection when chemical means are used. The clearing of debris from bridge pylons is important to increase flow at peak flow intervals and prevent flooding.

**Recommendations:**

* Integrated catchment management is required for the Liesbeeck and Black River systems.

* Areas within the 1:50 year flood return interval line (5.1m asl) of the Black River should not be developed upon, unless it is for land-use which sustains flooding without damage. This recommendation should be reviewed to see whether the flood area restriction needs to

be increased once the Black River hydrological study is complete.

* A thorough study of the options and trade-offs between "hard" and "soft" flood control measures is required.

* Public participation is needed in evaluating the flood control options and trade-offs between the hydrological, natural environment and development needs.

* Current management actions of weed clearance and dredging need to be maintained, but they must be undertaken with circumspection because of their ecological impacts.

**Key Decision-Making Criteria:**

* The area within the 1:50 flood return interval line (5.1m asl) of the Black River should not be developed upon, unless it is flood sustainable development.

* The trade-off between hydrological, ecological and development needs is important.

**2.5.1.2 Water Quality:**

**Factual Background:**

The Black River is severely polluted being hazardous to human water-contact and many organisms within the river. This pollution has various origins: two sewage works (nutrients and trace metals), stormwater run-off (chemical, bacterial, litter, sediment) and industrial (chemical). The water quality of the river has improved significantly since 1985 due to improvements in the Athlone Sewage Works. Nonetheless, some nutrient levels and trace metals are still higher than recommended and toxic to some organisms. Furthermore, the Black River is biologically degraded and depauperate. The Liesbeeck River water quality is poorly covered in the BLR, but it appears to be less polluted than the Black River, although pollution levels are still high.

Recreationally the Liesbeeck and Black rivers are only used for fishing and bird-watching. The cut-off section of the Liesbeeck River is virtually stagnant and is weed infested.

**Analysis:**

The nutrient and trace metals levels discussed in the BLR are the average concentrations based on water sampling at various stations. By its very nature sampling may miss peak variations (unless hourly) that have a far greater impact on organisms than a lower long term average. Pollution pulses can kill organisms even if the long term average is low. The measurement data of the water quality is thus only a rough indicator of the likely ecological impact. The water quality and hence ecological impact is likely to vary with season, as in summer the relative contribution of the sewage works in terms of flow volume will be proportionately higher than in winter. In winter, during strong flow, the pollutants will be diluted. The pollutants in the water will tend to move through the ecological food web and concentrate in the higher trophic organisms such as the aquatic birds. It is possible that the water pollution could affect bird populations in terms of mortality and fertility rates.

Water pollution is a multi-sourced problem extending through-out the catchment, making it very difficult to manage. The ICM recommended for flood control also applies to the control of pollutants. Improved street cleaning (litter, dog faeces), repair of sewer leakages, commercial spillage control and public education are needed.

The sewerage works need to be further improved as they play a major role in the water quality of the Black River. This will entail considerable cost as it is stated in the BLR that the Athlone Sewerage Works improvements since 1979 have cost R31 million. The benefits of improving the water quality will be ecological, allowing the rivers to recover to a more natural state, and social, where people may be able to use the river for more recreational purposes. It is unlikely, however, that the Black River will ever be able to be used for water contact sport again due to the practical and financial constraints in improving the water quality to that extent. The Liesbeeck River has more potential for water quality improvement than the Black River as its catchment is partly on the vegetated slopes of Table Mountain, it flows through suburbs not industrial areas, and it does not have treated sewage flowing into it. The Liesbeeck River is less polluted and with litter traps and control of pollution in the catchment could be usable for recreation.

**Recommendations:**

* Integrated catchment management is needed to control pollution sources in the Black and Liesbeeck River catchments.

* The treatment systems in the sewerage works should be further improved in terms of the quality of water they pump into the Black River.

**Key Decision-Making Criteria:**

* The Liesbeeck River has recreation potential with proper management (water quality) while the Black River will probably never be utilisable for contact watersports.

### 2.5.2 Atmosphere

#### 2.5.2.1 Air Pollution

**Factual Background:**

Cape Town has an air pollution problem as the daily means of many air pollutants exceed the recommended maxima (nitrous oxides, nitrogen dioxide and non-methane hydrocarbons) and non methane hydrocarbons exceed the recommended monthly maxima. Air pollution levels are worst from May to September when there is an increased occurrence of temperature inversions.

The study area is likely to be impacted most by vehicle emissions, especially during peak traffic hours. Some local industry is also likely to contribute. The study area falls within a smoke control zone which means there are restrictions on the level of smoke that may be released in the area. The I&APs did not raise the issue of air pollution.

**Analysis:**

Air pollution can be hazard to human health especially, respiratory health. The actual concentrations in the study area are not known, but are likely to be similar to the rest of Cape Town, or slightly worse due to the proximity of the parkways and freeway. An aspect of the effect of air pollution on the health of Cape Town's population has been studied by von Schirnding (1988) who investigated lead levels in children and their environment in Woodstock, a suburb in close proximity to the Confluence Area. It was found there were substantially high lead levels in some children and there was a strong correlation of these levels with the proximity of major roads (vehicle lead emission). Von Schirnding (1988) recommends that schools, creches and hospitals should not be built close to major roads with high traffic flows. The hospitals in the study area are already there, but if increased traffic

flow were contemplated through the area the aspect of lead and other vehicle pollution should be considered.

Since air pollution is a general problem in the city, it needs to be tackled at that level. It is thus not a key determinant for the Confluence Area's land-use planning.

**Recommendations:**

* Any development that is undertaken in the study area should not contribute to, or worsen the local or regional air pollution problem.

* If increased traffic flows were to take place through the study area because of proposed development, the impact of increased air pollution on the hospitals needs to be considered (eg. lead).

**2.5.2.2 Noise Pollution:**

**Factual Background:**

The noise levels are high in the study area, a study to the south-west of the study area indicated unacceptably high noise levels adjacent to the Black River Parkway. The study area is flanked by three major roadways and traffic noise is apparent throughout the site (personal observation).

**Analysis:**

The noise levels are only likely to be a health hazard (psychologically and physiologically) close to the parkways and freeway as the distance between the receiving point and the source is one of the most important determinants of site noise levels. At a distance greater than 15m from the road the noise levels fall by 4 dB(A) with doubling in distance (Department of the Environment, 1972). It is important that noise levels be kept to a minimum in the study area as the medical institutions require peaceful surroundings for their patients. Noise levels can be reduced through mitigatory measures such as earth berms, reduction of traffic speed and insulation of dwellings (Dept. of Env., 1972).

Since the impacts of noise pollution are primarily confined to the areas close to the major roads and there is the possibility of mitigation, it is not a key determinant to land-use

planning.

**Recommendations:**

* Any proposed development in the Confluence Area should consider the impact of noise levels on the area's users and implement mitigation measures where necessary.

### 2.5.3 Terrestrial

#### 2.5.3.1 Pollution

**Factual Background:**

The Transnet/SARCC land was reclaimed from wetlands by filling in with ash, builder's rubble and possibly other waste. The exact contents of the fill are not known at present and may contain material hazardous to groundwater. Some of the I&APs also expressed concern over the possible contents of the dump. Aberman (1993b) states contamination of soils through years of heavy industrial use may have occurred in the C-BR area, but this does not apply to the Confluence Area.

**Analysis:**

If the dump only contains ash and builder's rubble then it should not pose a threat to the groundwater. If there are hazardous materials then these could affect organisms in the adjacent water systems and add to the pollution levels. It is doubtful that any of the groundwater is used for human consumption so that it is unlikely to be a potential problem in this regard. The hazardous material, if present, is also unlikely to be so toxic that it would preclude any development on top of the dump. The possible toxicity of the dump is not held to be a key determinant to land-use planning.

The possible contents of the dump should be investigated and this could be done by obtaining old South African Transport Services (SATS) records (previous owner), or if these are unavailable, by taking soil core for analysis. The CCC should request the current owners to undertake this. Any pollution that could be found would be the responsibility of the original polluter, ie SATS which now has been divided up into SARCC and Transnet. In other words, the principle of "the polluter pays" should be followed (Stauth and Baskind, 1992).

**Recommendations:**

* The contents and possible toxicity of the dump material on the SARCC and Transnet land should be established.

### 2.5.3.2 Substrate stability:

**Factual background:**

The alluvium deposits surrounding the rivers are likely to be deep due to the valleys having been filled in the past by river deposition.

The geotechnical characteristics of the Transnet/SARCC area which comprises of landfill are not known.

**Analysis:**

The alluvium covered areas present a constraint to the possible development of larger structures as the depth to bedrock is likely to be deep. Foundations on floodplain sites, such as the alluvial areas, are always difficult and expensive to construct, besides the problem of flooding. Frequently there is an irregular deposition of sediment which results in variable foundation conditions and with the high moisture content of the substrate (high water table near river) the bearing capacity is variable and limited (Legget, 1973).

The area covered by landfill may present problems for foundations as it is a reclaimed area with a high water table and it is flood prone at present. The area was filled in the 1920-1930's which may have allowed enough time for stabilisation. Legget (1973) notes that filled ground presents some of the most difficult design problems for foundations. A geotechnical survey would have to be carried out to determine the actual bearing capacity and possible extent of possible constraints.

These constraints of substrate foundation suitability on the SARCC and Transnet land need investigation but they can be overcome with money and good design. They are thus not a key factor for land-use decision-making. The alluvial areas could also be built upon with money and good design, but it is likely to be more difficult than for the railways land. The proximity of the river (high water table, flooding) and the river sediment make the alluvial areas unsuited to structural development so that this is considered a key decision-making

criterion.

**Key Decision-making Criteria:**

* Alluvium deposit areas are unsuited to structural development and should be avoided.

## 2.6 POLICY

Policy encompasses those factors which place the Confluence Area in its local or regional context. The Confluence Area cannot be viewed in isolation as it is structurally and functionally integrated with the city. The policy factors are important to land-use planning as they provide a regional framework against which the site-specific factors can be assessed (see chapter 3). There are three subheadings in this section, namely metropolitan land-use, peripheral land-use and I&AP visions. The first two deal with policies and plans that have been put forward by the Western Cape Economic Development Forum (WCEDF), the CCC and other municipalities. The I&AP visions are those that were presented in the BLR. The factors for the subheading of "metropolitan" are the CMA Area Guide Plan, the Greening the City report, the Interim Metropolitan Development Framework and the WCEDF Public Land Release document. Under the subheading of "local" are included the C-BR Contextual Frameworks, the Observatory Policy Plan and the Maitland Local Area Plan. The subheading of I&AP visions forms a factor by itself.

### 2.6.1 Metropolitan Land-Use

#### 2.6.1.1 CMA Guide Plan- Volume 1: The Peninsula (Department of Development Planning, 1988)

**Factual Background:**

The Guide Plan contains legally binding regional guidelines. General guidelines of relevance to the study area are that natural assets must be protected, higher residential densities are needed, a multi-nodal metropolitan structure is needed, and historical buildings and the character of their surrounds must be maintained.

The guideline map for Cape Town land-use identifies the study area for use as open space, urban development and government use. Specific guidelines for urban development are that

it should not occur on greater than one in six slopes, no development is to be allowed in areas adjudged by the Administrator to be floodplains and exceptional natural assets should be maintained (eg. watercourses).

The study area is identified as a potential nature area in the CMA Guide Plan.

**Analysis:**

The CMA Guide Plan was produced in 1988 and is thus quite dated and is likely to change with the new urban government. The guide plan map basically confirms the broad zoning that is present in the study area at present. Due to its regional nature, the plan offers relatively little in terms of land-use planning in the study area, except for the broad guidelines which are "planning common sense" to a large degree. Nevertheless they are relevant, although the 1:6 slope criteria can be disregarded as only a few short slopes in the study area fall within that category. It is significant that the plan does list the Confluence Area as a potential nature area, a river corridor.

**Key Decision-making Criteria:**

* No development is to be allowed on declared floodplains.

* Natural assets must be protected.

* There is a need for higher residential densities.

* Historical buildings and the character of their surrounds must be maintained.

### 2.6.1.2 Greening the City: Open Space & Recreation Plan for Cape Town (City Engineers Department, 1982)

**Factual Background:**

The report focuses on linked open space in terms of recreation (amenity), although there is consideration of natural resource conservation. A coast-to-coast greenway is advocated which includes the Confluence Area. Basic policies include the conservation of ecologically valuable areas to maintain the amenity value of the natural landscape, the maximisation of the recreational potential of rivers and vleis, the development of city-wide trails and a

greenway system, and the encouragement of community involvement in provision and management of neighbourhood amenity.

In the report there are proposals for developing Liesbeeck Lake (identified as "high priority"), the RBS ("low priority") and Black River ("low priority") for recreation. In the report the study area falls within Mowbray, an area deemed to have sufficient developed public space.

**Analysis:**

The greening report is a dated document (1982) which has largely not been implemented because of the lack of funds, ie in practise it is ineffectual. It is unlikely that this lack of funding will change as the priority in the city, and the country as a whole, is to address social imbalances as regards housing, education and infrastructure. The only other possible source of funding is the private sector who would want to see a capital return on any investment. Private and public development could provide recreational opportunity and open space in an integrated manner with the development itself.

The greening report can also be criticised for its amenity approach and lack of true conservation ideals. Poynton and Roberts (1985) point out that the report does not uphold biogeographical principals which are essential for the maintenance of the ecological functioning in the city-scape.

Despite these criticisms the principals and proposals underlying the report are still valid. These are important decision-making criteria. However, open space planning must also consider biogeographical principles for the maintenance of urban ecological systems and this must also be added to serve as a key criterion.

**Recommendations:**

* If private or public development occurs in the study area, provision should be made to integrate open space and recreation with the development.

**Key Decision-Making Criteria:**

* Ecologically valuable areas should be conserved to maintain the amenity value of the natural landscape.

* Biogeographical principles need to be considered in open space planning and ecologically valuable areas should be conserved for the maintenance of urban ecological systems.

* The recreational potential of rivers and vleis should be maximised.

* City-wide trails and a greenway system should be developed.

* Private or public development should be linked with the provision of open space and recreation.

* There is a lack of public funds for open space development.

* The rivers are identified as part of MOSS.

**2.6.1.3 Interim Metropolitan Development Framework (IMDF) (MDF Coordinating Working Group, 1993):**

**Factual Background:**
The IMDF was produced in 1993 as a discussion document, but it has not been approved by the WCEDF. The principles underlying IMDF are that an equitable and efficient city must have higher urban densities and more public transport use. One of the major goals is to address the basic needs of the poor (employment, housing, education).

IMDF principals include the guiding/containment of urban sprawl and the limiting of expansion into areas of recreational or ecological potential, the intensification of residential and other urban development in existing areas where employment and public transport access is greatest (ie activity corridors), the desirability of green areas to provide for amenity, stormwater management and conservation of natural systems.

The IMDF overlay map indicates that the majority of the study area falls under MOSS and that there is the intersection of two activity corridors (Main and Klipfontein Roads) to the south of study area and the presence of one activity corridor to the north-west (Voortrekker Road).

**Analysis:**

Even though the IMDF document is only a discussion document it is an indicator of what is likely to take place in the city as the WCEDF is a forum of a wide range of Cape Town interest groups. The principals are relevant and useful to land-use planning in the Confluence Area. It is significant that most of the study area is identified as MOSS around which densification is proposed along the activity corridors.

**Key Decision-Making Criteria:**

* The needs of the poor need to be addressed (employment, housing, education)

* The activity corridors surrounding the Confluence area could be densified.

* Recreational and ecological areas need to be maintained.

* The Confluence area is identified as part of MOSS.

**2.6.1.4 WCEDF: Proposed Guidelines for Public Land Release (Urban Development Commission of the WCEDF, 1993):**

**Factual Background:**

Strategic public land should address the key issues of affordable housing, long term need for recreational and open space, and the creation of training and employment opportunities. The criteria for defining strategic public land include vacant or underutilised land, size (greater than 2ha), potential value, location, cultural resource value and natural resource value.

The guidelines state that public land should be used for its primarily intended purposes unless they are no longer required and that public participation, a package of plans approach, and the use of IEM for environmentally sensitive land are needed.

**Analysis:**

If the study area is compared to the criteria for qualifying as strategic public land, then any of the land owned by the public institutions could qualify for all of them if it were to be sold. With regard to the institutions, the principal that primary uses should be maintained, unless no longer required, is important in the debate as to whether they should relocate. It is not

surprising that the WCEDF advocates public participation as the body is a public forum and it does fall in line with IEM and current social trends. The package of plans approach is a useful one as it does work form a broader policy level down to development/project level. The Confluence Area planning is likely to fit into the C-BR "planning packages".

**Recommendations:**

* The release of public land in the Confluence area should follow WCEDF guidelines.

**Key Decision-Making Criteria:**

* Public land should be used for its primarily intended uses unless they are no longer required.

* Strategic public land should address the key issues of affordable housing, long term need for open and recreational space, and the creation of training and employment opportunities.

### 2.6.2 Peripheral Land-Use

#### 2.6.2.1 C-BR Contextual Frameworks (Aberman, 1993a, 1993b):

**Factual Background:**

The C-BR area redevelopment process is the most significant one in Cape Town's recent history (300ha land). It follows the package of plans approach where the CCC regional studies tie in with public participation and the Transnet and SARCC studies. The goals for the C-BR are the encouragement of high density housing and mixed land-use. There is the need to balance economic opportunities in the area against those of having employment opportunities away from the majority of the labour force who live on the Cape Flats. The C-BR studies also investigated the possible roles of Export Processing Zones (EPZ), the 2004 Olympics and the Millennium Exposition in Cape Town's development planning.

The open space referred to in the study is mainly within the Confluence Area.

**Analysis:**

Due to the scale of the likely land-use change in the C-BR area, this will undoubtedly have a large influence on the Confluence Area. The type of land-use that will eventually occur

in the C-BR area will create various demands in the Confluence Area in terms of transport infrastructure, open space, housing, shopping facilities and so on. In this regard, the future of the Confluence Area must be planned in tandem with, and regard to the C-BR development. It is likely that the C-BR area will be used for housing, industry and/or commercial activity because of its strategic location and lack of natural biophysical assets. If this is the case, then the Confluence Area would have added significance with regard to its open space and recreation potential.

In the "mega-project" (eg. EPZ) proposals there has up to now been no specific mention of the Confluence Area. The likelihood of the study area being used on a large scale for these mega-projects is probably small as the area has relatively little vacant or unused land, except for the Liesbeeck Sportsgrounds and SARCC/Transnet land. It is conceivable that the Hartlyvale/Malta Park complex may be used for the 2004 Olympics, even if it is only for training purposes.

**Recommendations:**

* The formulation of a policy plan for the Confluence Area must be undertaken in tandem with and regard to the C-BR study.

**Key Decision-Making Criteria:**

* The future of the study area is strongly influenced by and dependant on developments on the adjacent C-BR site.

* The significance of open space may increase in the Confluence Area if the C-BR site is developed for housing, commercial or industrial purposes.

* The C-BR area is most likely to be used for commercial, industrial and/or housing purposes.

### 2.6.2.2 Observatory Policy Plan (Sorrell, 1993):

**Factual Background:**

Observatory is a densely developed suburb with little open space. The Liesbeeck River is highlighted as important open space for its residents. Mention is made of the fact that the

sporting facilities of the Harltyvale complex cut off Observatory from the Liesbeeck River.

The policy includes the principle of protecting historically and aesthetically significant buildings.

The plan was not extended to the Confluence Area, although it is part of the Observatory suburb to the west of the Black River ( *pers. comm.* I. Iverson).

**Analysis:**

The study area would be strongly affected by any land-use change within the high density area of Observatory as it abuts its western flank. The Confluence area could fulfil a local open space function for the suburb which is densely developed. Access to the Liesbeeck River would need to be addressed to make this a possibility. The plan's policy of historical building conservation is important because of the number of national monuments found in the suburb, including the Confluence Area (see section 2.4.1.1).

**Recommendations:**

* Methods of improving access to the Confluence Area by Observatory residents need to be investigated.

**Key Decision-Making Criteria:**

* The Confluence Area could fulfil a local open space function for Observatory which is densely developed with little open space.

### 2.6.2.3 Maitland Local Area Plan (Doweling and Sorrell, 1992)

**Factual Background:**

There is a planned increase in residential densities and the suburb has three major activity corridors. The plan accepts the quantity of local open space but states that it needs to be better maintained. The plan also aims to protect historically and architecturally significant buildings.

**Analysis:**

Maitland abuts most of the eastern flank of the study area so that an increase in residential

density in that suburb could increase the need for open space for the suburb as well as pressure for commercial development (eg. services) within the Confluence Area. Even though the plan accepts the current level of open space, areas such Maitland Garden Village and the Berkley Road residential area have a direct interest in the future of open space within the study area.

**Key Decision-Making Criteria:**

* The densification of Maitland could enhance the significance of open space within the Confluence Area as well as increase pressure for commercial activity.

### 2.6.3 I&AP Visions

**Factual Background:**

The range of visions expressed by the I&APs includes the components of education, recreation/sports facilities, open space (MOSS, green lungs), conservation, housing, commercial, light industry and transport. Only heavy industry was not proposed. There are four main categories of visions: firstly keep the area as is, secondly develop as open space/green use, thirdly mixed/integrated use (a mixture of 2. & 3.) and fourthly non-open space development.

Overall the area was regarded as having open space potential with either pure open space visions or mixed/integrated visions.

**Analysis:**

The dominant concern raised by I&APs was that, at least to some degree, open space is an important component of the Confluence Area. This perception is probably related to the historical "green nature" of the area as well as to the two rivers. It is significant that only heavy industry was not raised as a possible land-use. The I&APs appear to have an appreciation of the area's environmental characteristics as none of them put forward that it should be developed at all costs. The mixed land-use vision supports this as some areas of the Confluence Area were regarded as development opportunities, while others should remain for open space. The predominant theme of open space was also reflected by the suggestion made by some I&APs that the area was an opportunity for environmental education. The rivers could be used as an outdoor classroom to illustrate the problems of their management

within the urban context.

**Key Decision-Making Criteria:**

* The I&APs value the open space character of the Confluence Area.

* The I&APs predominantly envision the area as being suitable for open space development or a mixture of open space and some other land-use such as housing, industry (except heavy) or commerce.

* The Confluence Area presents an opportunity for environmental education.

# CHAPTER 3: LAND-USE ALTERNATIVES

The key decision-making criteria produced in Chapter 2 are evaluated in this chapter to derive the land-use alternatives that are open to the decision-maker in the Confluence Area. The evaluation consists of three steps. In the first step, the key policy decision-making criteria are evaluated to identify the feasible land-use categories for the study area within its local and regional context (section 3.1). This sets the framework within which the site-specific land-use alternatives can be determined. In the second step, site-specific decision-making criteria that are spatial constraints to land-use, are mapped and used to aid the delineation of land-units (section 3.2). These land-units divide the study area into natural functional units in terms of spatial constraints, thereby making the discussion of the land-use alternatives more area-specific. In the third step, the land-use alternatives for the three land-units are produced by evaluating the site-specific and policy decision-making criteria within the land-use options framework (section 3.3).

## 3.1 Key Policy Decision-Making Criteria: Feasible Land-Use Options

The key policy decision-making criteria of Chapter 2 are listed in Table 1 and they place the Confluence Area in its local and regional context. The criteria are used to answer the question: "what land-uses are feasible options for the study area in light of the needs of the local area and Cape Town as a whole?" Taken at a broad level, any land-use that currently occurs in Cape Town could be applied in the study area, but there is a clear direction for the area, in terms of what the policies and plans have identified as important, as well as the views of the I&APs. The feasible land-use options that are identified in this section are at a broad scale, for instance the option of housing is not further categorised into light, medium or high density. The specific details of land-use are beyond the scope of this dissertation (see Chapter 1) as these will have to be addressed in the CCC planning process.

Before specific land-use options are discussed, there are policy decision-making criteria which are general in nature and which impact on all land-use options. They can be viewed as broad principles that need to be considered in land-use decision-making. Probably the most important of these is that the future of the study area is strongly influenced by and dependent on developments within the adjacent C-BR site. The lack of certainty as to the nature of these developments is a relatively minor obstacle for defining land-use alternatives

# Table 1: Local and Regional Decision-Making Criteria (Policy)

| Source (Policy/Plan/Vision) | Local and Regional Decision-Making Criteria (Policy) |
|---|---|
| CMA Guide Plan- Volume 1: The Peninsula | * No development should be allowed on declared floodplains.<br><br>* Natural assets must be protected.<br><br>* There is a need for higher residential densities.<br><br>* Historical buildings and the character of their surrounds must be maintained. |
| Greening the City: Open Space and Recreation Plan for Cape Town | * Ecologically valuable areas should be conserved to maintain the amenity value of the natural landscape.<br><br>* Biogeographical principles need to be considered in open space planning and ecologically valuable areas should be conserved for the maintenance of urban ecological systems (criterion added by author).<br><br>* The recreational potential of rivers and vleis should be maximised.<br><br>* City-wide trails and a greenway system should be developed.<br><br>* Private or public development should be linked with the provision of open space and recreation (criterion added by author).<br><br>* There is a lack of public funds for open space development (criterion added by author).<br><br>* The rivers are a part of MOSS. |
| IMDF | * The needs of the poor need to be addressed (employment, housing, education).<br><br>* The activity corridors surrounding the Confluence Area could be densified.<br><br>* Recreational and ecological areas need to be maintained.<br><br>* The study area is identified as part of MOSS. |

| Source (Policy/Plan/Vision) | Local and Regional Decision-Making Criteria (Policy) |
|---|---|
| WCEDF: Proposed Guidelines for the Release of Public Land | * Strategic public land should address the key issues of affordable housing, long term need for open and recreational space, and the creation of training and employment opportunities.<br><br>* Public land should be used for its primarily intended purposes unless they are no longer required. |
| C-BR Contextual Framework | * The future of the study area is strongly influenced by and dependent on developments in the adjacent C-BR site (criterion derived by author).<br><br>* The significance of open space may increase in the Confluence Area if the C-BR site is developed for housing, commercial or industrial purposes (criterion derived by author).<br><br>* The C-BR area is likely to be used for commercial, industrial and/or housing purposes (criterion derived by author). |
| Observatory Policy Plan | * The Confluence Area could fulfil a local open space function for Observatory which is densely developed with little open space (criterion derived by author). |
| Maitland Local Area Plan | * The densification of Maitland could enhance the significance of open space within the Confluence Area as well as increase pressure for commercial activity (criterion derived by author). |
| I&APs | * The I&APs value the open space character of the study area.<br><br>* The I&APs predominantly envision the area as suitable for open space development or a mixture of open space and some other land-use such as housing, industry or commerce.<br><br>* The Confluence Area presents an opportunity for environmental education. |

for the study area, since the decision-maker can in any event choose between the alternatives presented, once the information on the C-BR area is available. An assumption is made for the C-BR area that it will most likely be used for commercial, industrial and/or housing purposes, due to its strategic location in relation to the CBD. Another general criterion is that strategic public land should address the key issues of affordable housing, the long term need for open and recreational space, and the creation of training and employment opportunities. Related to this is the criterion that public land should be used for its primarily intended purposes unless they are no longer required. The issue of public land-use is an important one in the Confluence Area and needs to be considered in the identification of land-use alternatives. The last general criterion is that no development should occur on declared floodplains. This is very significant and is used for identifying land-units in section 3.2.

Table 1 indicates that the Greening the City Report and the IMDF identify the Confluence Area as being part of MOSS. The I&APs also hold the view that the open space character of the area is important and that the future use of the area should be in the form of open space or open space mixed with some other land-use(s). The strong emphasis on open space for the study area by I&APs and planning policy, together with the fact that it does have two rivers flowing through it, means open space is probably the strongest land-use option. This open space function could also be enhanced if the surrounding suburbs are densified. The criteria supporting this include that the Confluence Area could fulfil a local open space function for Observatory and Maitland, that the activity corridors surrounding the study area could be densified and that the C-BR area could most likely be used for commercial, industrial and housing purposes. Seen in this light, the role of the Confluence Area is broadly as a "green island", surrounded by an increasingly densified "sea" of development.

In terms of land-use options, recreation and conservation (biological), are strongly allied to that of open space. Criteria relating to this are the maintenance of recreational potential of rivers and vleis, the city-wide development of trails and greenway system, the conservation of ecologically valuable areas for the maintenance of amenity value of the natural landscape, the protection of natural assets, and the consideration of biogeographical principles in open space planning. Recreation and conservation may not always be directly compatible, depending on the type of recreation and people numbers, but with careful management and planning these can be overcome to a large degree. For the purposes of the discussion of

land-use alternatives in the study area, it is thus logical and convenient to combine open space, recreation and conservation as one feasible land-use option for the Confluence Area. Nevertheless it is important in the discussion of land-use alternatives to specify the type of recreation with regard to open space. The linking of conservation and recreation to open space does not imply that these areas have no other uses such as flood control, but these are clarified where necessary in the discussion.

The majority of policy key decision-making criteria are for open space related uses, but this does not mean other land-use options such as housing, commerce/business, institutional or industry are necessarily unsuited to the study area. The study area itself is not homogeneous and can host different land-uses, as it does at present. The policies and plans analysed do not specifically identify the Confluence Area for uses other than open space and its current uses, but some of the I&APs suggested that different uses could occur in conjunction with that of open space, with the exception of heavy industry. However, there are general key criteria, in particular the need to provide affordable housing, to increase residential densities and the creation of training and employment in Cape Town. Densification has been officially proposed for the surrounding suburbs, especially the activity corridors. Therefore overall, the land-use options of housing, commercial/business, industrial (except heavy) and institutional (medical, scientific, education) are feasible and cannot be excluded for the study area. Included under education is the criterion that the study area presents an opportunity for environmental education. The criterion of conservation of historical buildings and their surrounds does not qualify as a land-use, although it is a factor that has to be considered in the discussion of land-use alternatives.

The aforegoing land-use options have to be interpreted in the light of addressing the needs of the poor. With the new government in place and its Reconstruction and Development Programme, it is reasonable to assume that there would be some pressure to utilise the study area for the purposes of addressing social inequities with regard to housing, education and employment. The current political changes may also make a great deal of the past policy and planning outdated which has up to now placed emphasis on open space in the study area. High land values in the Confluence Area could militate against the possibility of directly uplifting the poor, but there is a large amount of public land in the area which could change its land-use if the government decided this would increase social welfare. The issue of addressing social imbalances is thus a vital consideration in the discussion of land-use

alternatives.

In summary, the feasible land-use options for the Confluence area are, without consideration of the site-specific characteristics:

a) open space/ recreation/ conservation (biological)
b) housing
c) commercial/business
d) industrial (except heavy)
e) institutional (medical, education, scientific)

It must be noted that of these options, open space related land-use has been the most strongly advocated and identified in the Confluence Area by policies, plans and I&APs.

## 3.2 Key Site-Specific Decision-Making Criteria: Identification of Land-units

Table 2 contains the list of site-specific decision-making criteria identified for the factors considered in Chapter 2. Of these criteria, eight are of a spatial nature and can be mapped as constraints to land-use. Some other criteria, for example zoning and land ownership could also be mapped, but they are neither specifically constraints or opportunities, since this depends on the context in which they are being discussed. Figure 4 indicates the land-use constraints of a biological or physical origin and Figure 5 those of a social origin. These constraints are not all on the same level since they affect various land-uses differentially. For instance, the transport network rules out any other land-use in the area that it occupies, while the wetlands are a constraint to all land-use, except for that of open space/conservation and some forms of recreation. For this reason the constraints need to be considered individually for different land-uses. When Figures 4 & 5 are compared, however, it is apparent that the 1:50 year floodline encompasses the area of a substantial number of the other constraints. The pervasive nature of the floodline means it over-rides or reinforces many of the other constraints. Furthermore, it is the most important spatial constraint as it endangers life and property and strongly determines the feasibility of all land-uses with the exception of conservation. For these reasons the floodline is an obvious factor for defining land-units in the Confluence Area. The three units defined by the floodline are the "River Floodlands" (area below the 1:50 year floodline), the "Valkenberg-West Island" (surrounded by the floodline) and the "Eastern Highland" (Figure 6).

# Table 2: Site-Specific Decision-Making Criteria

| Category | Site-Specific Decision-making Criteria |
|---|---|
| Procedural | * Planning in the study area must adhere to the principles of IEM.<br><br>* Current land-ownership is an important constraint to land-use planning as the current land-owners have legal rights over their land.<br><br>* The views of local and regional I&APs must be taken account of in the planning process.<br><br>* The current zoning scheme is important as it confers existing rights to land-owners and sets a precedent for future zoning.<br><br>* Publicly owned land may be more flexible to change in land-use which addresses the needs of the general public in comparison to private land.<br><br>* Whether or not Transnet is regarded as a public or private body has implications for land-use in the Liesbeeck Sportsground area. |
| Management | * The demarcated road reserves for road widening are important land-use planning determinants which restrict other land uses (Figure 5).<br><br>* The proposed Malta-Berkley link road reserve is an important restriction on other land-use within that reserve (Figure 5). |
| Ecological Resources | * The wetlands in the Confluence Area should be conserved as an ecological resource (Figure 4).<br><br>* The aquatic avifauna is an important ecological resource that needs to be conserved and it is dependent on the survival of the wetlands. |
| Social Resources | * The current land-use of institutions is an important consideration as they have legal and historical rights to the area; they fulfil important local and regional functions.<br><br>* The institutions in the study area could rationalize their land-use and release land for other purposes.<br><br>* High land value in the Confluence Area is an important criterion as it constrains land-use alternatives.<br><br>* The Black River and Liesbeeck Parkways, Settler's Way (N2), Berkley Road, Alexandra Road and the railway bridge are important infrastructural resources and immovable constraints to land-use planning (Figure 5).<br><br>* The declared National Monuments must be conserved as a social resource (Figure 5).<br><br>* The two extra high voltage cables on the eastern bank of the Black River are an immovable constraint to land-use (Figure 5).<br><br>* The study area has a large potential for recreation (especially the passive type) as it is underutilised at present due to the degraded nature of the area. |

| Category | Site-Specific Decision-making Criteria |
|---|---|
| Hazards | * The area within the 1:50 year flood return interval line (5.1m asl) of the Black River should not be developed upon, unless it is flood sustainable development (Figure 4).<br><br>* Alluvium deposit areas are unsuited to structural development and should be avoided (Figure 4).<br><br>* The trade-off between hydrological, ecological and development needs is important.<br><br>* The Liesbeeck River has recreational potential with proper management (water quality) while the Black River will probably never be utilisable for water contact sports. |

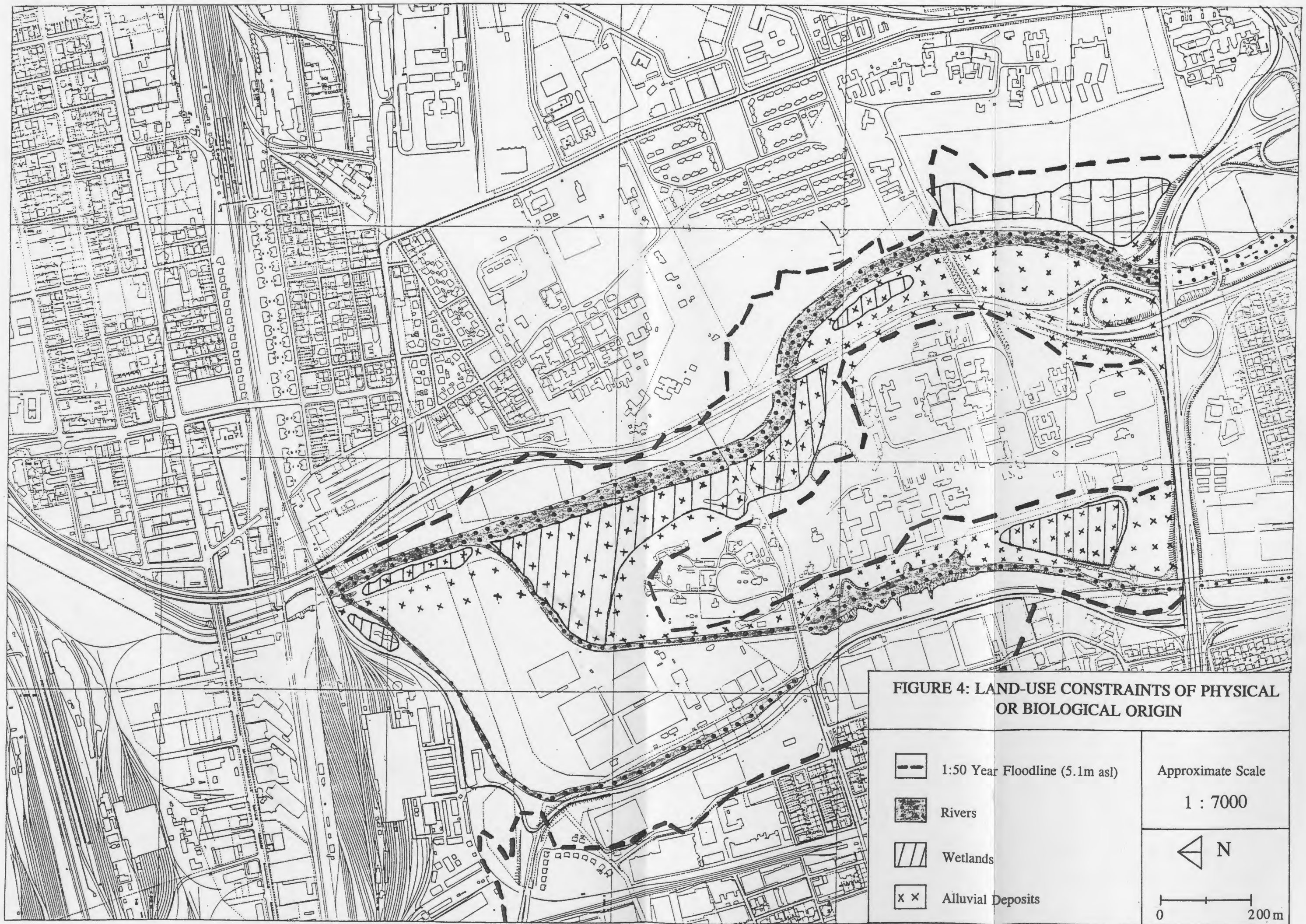


FIGURE 4: LAND-USE CONSTRAINTS OF PHYSICAL OR BIOLOGICAL ORIGIN

1:50 Year Floodline (5.1m asl)

Rivers

Wetlands

Alluvial Deposits

Approximate Scale

1 : 7000

N

0 200 m

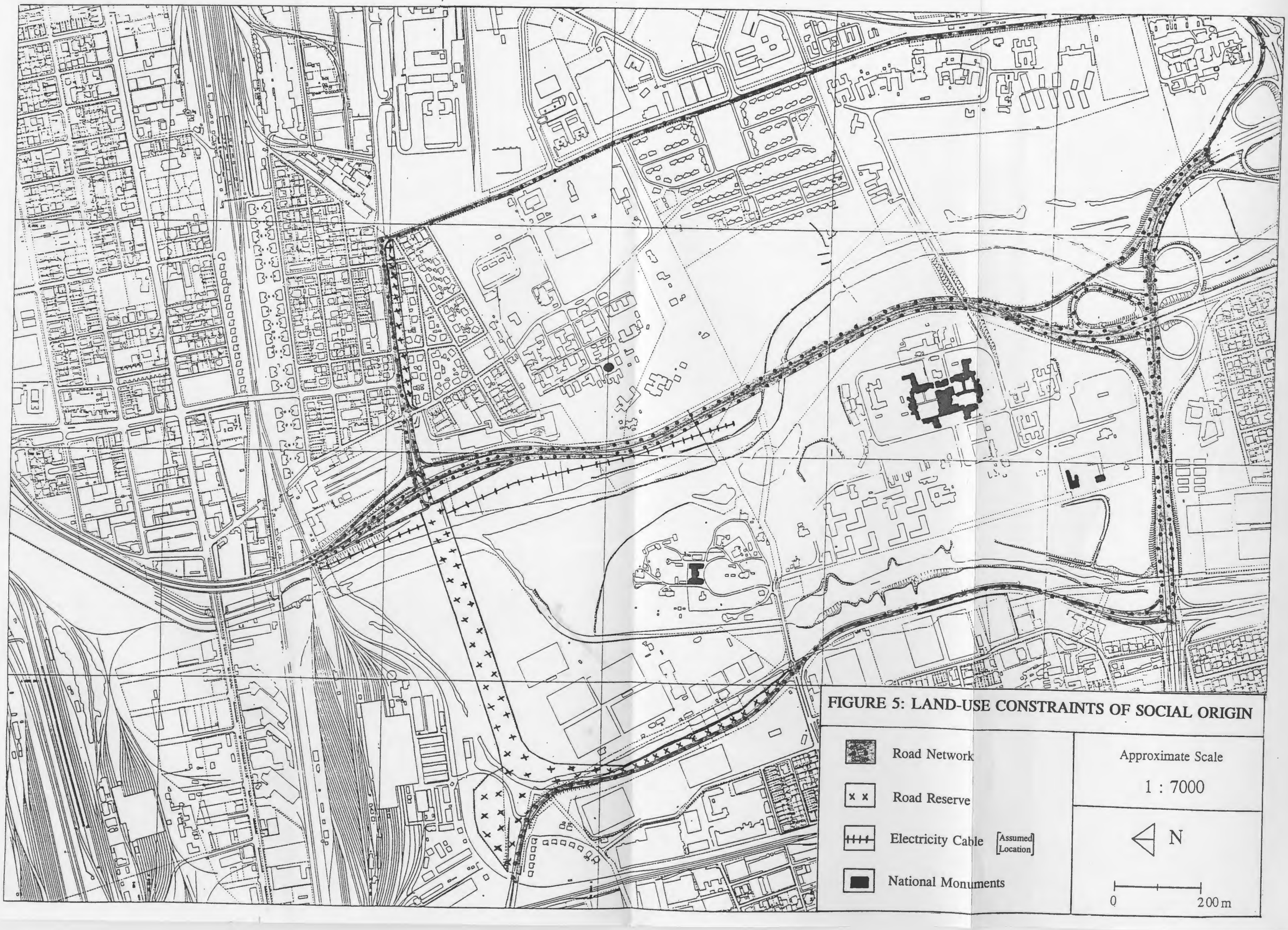



**FIGURE 5: LAND-USE CONSTRAINTS OF SOCIAL ORIGIN**

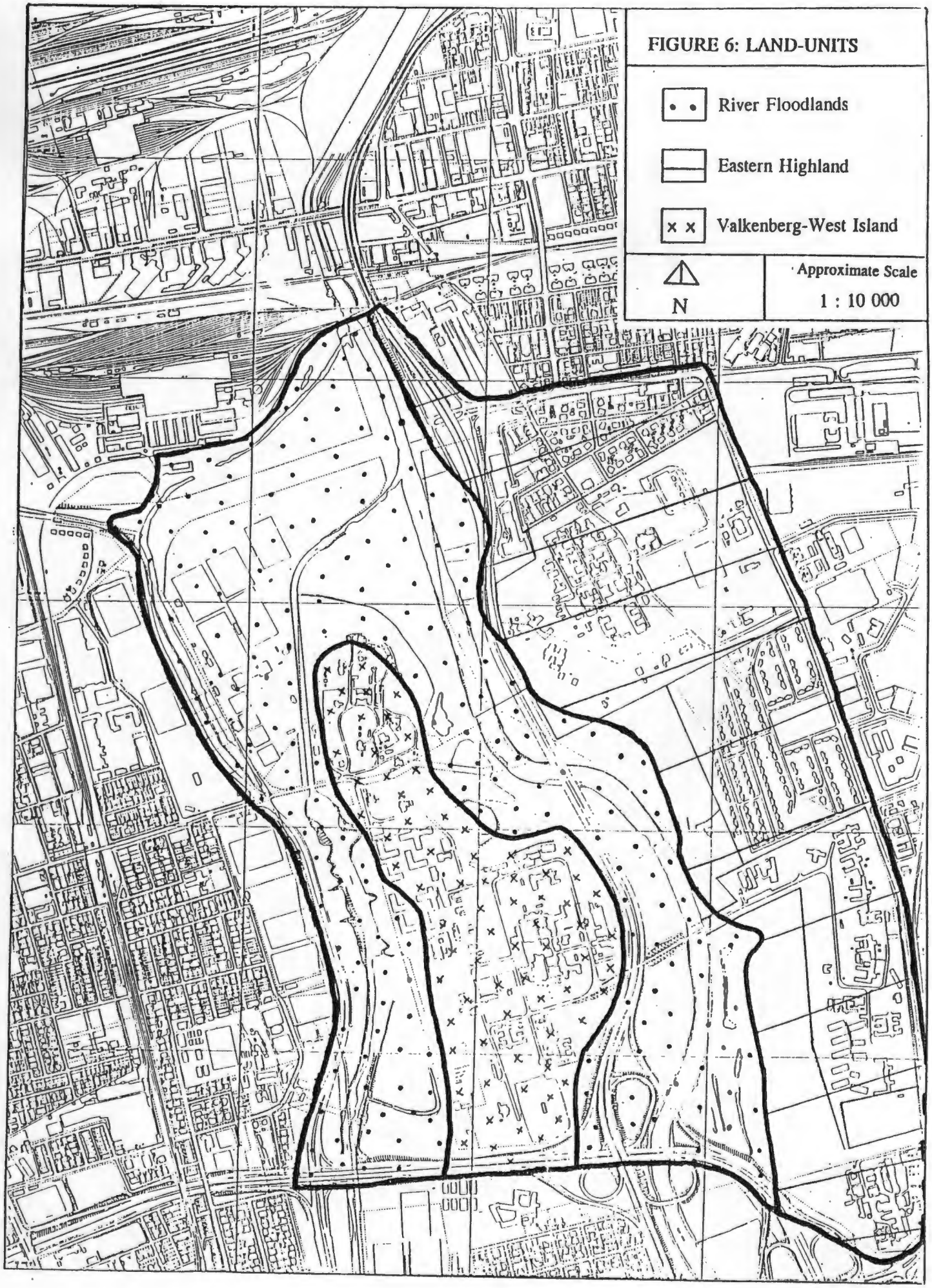


FIGURE 6: LAND-UNITS
River Floodlands
Eastern Highland
Valkenberg-West Island
N
Approximate Scale
1 : 10 000

## 3.3 Land-Use Alternatives for the Confluence Area Land-units

The land-use alternatives are produced by weighing-up and trading-off of the key decision-making criteria in Tables 1 and 2 and Figures 4 to 6 within the framework of the identified land-use options. Other information found in the BLR is also used, especially Maps 6 (ownership and land-use) and 7 (zoning). For each unit a description of those land factors identified as important by the criteria is first presented, before the land-use alternatives are discussed.

### 3.3.1 River Floodlands

**Description:**

The biggest constraint to land-use in this land-unit is the fact that it falls below the 1:50 year floodline, ie it should only be used for flood-sustainable development (Figure 4). Flood-sustainable land-uses include recreation facilities and conservation which are not damaged during flooding. For current land-use this is the case as the Transnet land is used for recreation (golf driving range) and the majority of the other land in this unit is owned by the CCC and is used for recreation (fishing, walking, bird-watching) and conservation (RBS). The SARCC/Transnet land (Varsvlei area) is unused at present. The zoning of these areas does match the current land-use as the SARCC/Transnet land is zoned as Undetermined, the Transnet land as Community Facilities Use Zone and the CCC land as Community Facilities Use Zone, Public Open Space and Street Purposes.

The lower portions of the SAAO and Valkenberg-West properties (both Community Facilities Use Zone), also fall within this unit, although it is only significant for the SAAO as a fairly large proportion of its land falls within the floodline. On the SAAO property, the land below the floodline is unused, with the exception of some buildings that do fall within the line. For the Valkenberg-West property there are two buildings below the floodline.

Besides the risk of flooding, the other constraints to land-use in this land-unit are the wetlands, the rivers, the alluvial deposits, the high voltage power line, the road reserves and transport network (Figures 4 & 5). The CCC land is influenced by most of these constraints and the Transnet land by none. The SARCC/Transnet land is separated from the Transnet property by the Malta-Berkley Road reserve (CCC owned) and it has the Old Liesbeeck

River course flowing through it. The CCC land is characterised by the extensive wetlands (RBS), the road network and the alluvial areas.

The River Floodlands are an integral part of the CCC identified MOSS, where the rivers act as a green corridor.

**Land-Use Alternatives:**

The CCC owned land is very constrained in terms of land-use alternatives by its current uses, as well as the identified constraints. It serves as a conservation area by way of the CCC declared RBS, it serves as a transportation corridor as well as an annual flood area, due to it being directly adjacent to the rivers (Figures 4 & 5). These services do not provide a direct economic return, but that is inconsequential as they may be considered as public services provided by a public body. These services are essential and cannot be removed without difficulty, such that the only other compatible land-use is recreation. The CCC land is suited to passive recreation which could be expanded from its current level of use. Examples are the planned Liesbeeck walkway expansion into the area and the banks of the Black and Liesbeeck rivers which can, according to the CCC Greening Report, be upgraded with picnic facilities. Recreational facilities requiring building of structures are unsuited to the CCC land because of the flooding. The balance of environmental and hydrological needs is important with regards to the CCC land as the proposed river widening could have a large impact. The RBS is threatened and the area may be less appealing to recreation if the river is widened. Overall, the CCC land has no other land-use alternatives besides its current use (recreation, conservation, flood area), although there exists the potential for the upgrading of recreational opportunity.

The Transnet and SARCC/Transnet land could, in principle, have numerous land-use alternatives, if it were not constrained by the 1:50 year floodline. Besides the floodline, the only other constraints are the Old Liesbeeck River course and the road reserve. There is pressure at present to develop this land as the railways companies require an economic return on the land. In the past, there were other sporting facilities on the Liesbeeck Sportsgrounds, besides the current golf driving range, but these were closed due to lack of patronage. It appears that the only manner in which the railways can make the area pay for itself is to sell it to a developer who can develop it for commercial, housing or industrial uses. In the past, proposals have been drawn up by the Graduate School of Business students (see BLR,

Chapter 6) who proposed developments protected by berms that hold the flood waters back. Berms, however, do not solve the problem of waterlogging caused by the site's high water table. Berms also ignore the site's natural role as a floodplain and they would increase flooding elsewhere by holding the water out of the site. It must be noted that the Liesbeeck Sportsgrounds are situated at the lowest point in the study area and fall within the 1:5 year floodline.

The fact that the Transnet and Transet/SARCC land is situated within the MOSS corridor and the 1:50 year floodline means the railways are unlikely to make a monetary return on the required uses of flood-sustainable recreation facilities or even conservation (wetland reclamation). Ideally, the land should be in the ownership of the CCC, or some other publicly focused body, which does not require an economic return. The CCC is unlikely to have the money available for the purchase of the land so that other options of acquisition would have to be investigated. It could be argued by some people that the SARCC, and even Transnet, are public bodies and could donate the land or sell it at a reduced price. Otherwise the CCC could undertake land swops with the railways or trade development rights elsewhere. Nevertheless, even if the land is owned by the railways or some other developer, the CCC can reject rezoning applications from the current zoning of Community Facilities Use Zone, if, for instance, non-flood-sustainable types of development were proposed. Should an appeal be lodged against the rejection, however, the Administrator can reconsider and if necessary over-ride the Council decision. Ownership of the land would thus give the CCC greater control and leave open the option of using the land for flood control measures such as retention ponds or wetland reclamation.

The margins of the SAAO and VH-West properties within the River Floodlands unit are not currently used, besides the few buildings present. These buildings can be protected with berms or abandoned if the costs are too high. No new buildings should be built in this area. These margins could be used for recreation such as walking/jogging/cycling if the landowners give consent.

### 3.3.2 Valkenberg-West Island

**Description:**

The Valkenberg-West Island is set above the 1:50 year floodline and the two major

landowners are the Foundation for Research Development (FRD)(SAAO) and the Department of Community Development (VH), while the two smaller landowners are the NMC and UCT (Figure 2). The area is largely public service orientated with the SAAO undertaking scientific research and the VH providing medical services. UCT will provide business accommodation in the area for 20 years through a lease with a developer before it becomes student accommodation, and the NMC is at present leasing its barnyard complex to a coffee shop for three years. In terms of the constraints map (Figure 5), this land-unit has three NMC declared buildings which should be conserved. Calls for the rationalization of the SAAO and VH have been made by some I&APs, but the institutions do legally own the land and they provide a service of local and regional importance, even national in the case of the SAAO. The current administrators of these institutions indicate there are no plans at present to relocate.

The character of the Valkenberg-West Island is one of open space because the relatively low density of buildings upon it giving a visual "green" impression. The two river systems on either side of the island contribute to this character.

**Land-Use Alternatives:**

Land-Use alternatives different to the ones currently existing in this land-unit will only be an option if the current landowners decide to sell their land wholly or parts of it. The consideration of land-use alternatives has to take strong cognisance of the Island's character, its role as part of the MOSS, as well as its proximity to the rivers on either side of it. The island has historically had a land-use of a public nature and this presents an opportunity for retaining the area's character. The I&APs' views on the importance of open space are likely to centre on the river systems and the open space nature of the land-use on the island between them. The current land-use, including the coffee shop and UCT complex, is not in conflict with the character of the area, but public accessibility to land for recreational purposes does need to be investigated.

The Valkenberg-West Island has no major spatial constraints to land-use, with the exception of the point localities of the NMC declared buildings and the N2 freeway (Figures 4 & 5), so that theoretically any of the five identified land-use options could take place here. This land-unit could be used for conservation but this would require an expensive and difficult restoration of vegetation communities as the area does not have any remaining noteworthy

biological resources. Conservation is thus a land-use which can be dismissed for this unit.

Ideally, the Island's character and historical nature lend themselves to land-uses of open space/recreation as well as institutional use (medicinal, educational, scientific). Passive recreation could be increased in the area if the current landowners provide consent. Educationally, environmental education has possibilities with the proximity of the rivers and even formal education facilities such as schools would not be out of character with the area.

Industrial land-use would be in total opposition to the Island's character, while housing and some forms of commercial activity would be so, albeit to a lesser degree. Housing is a possible land-use alternative as it has flexibility in terms of density and type, but its actual siting would have to be weighed up between the need for densification and housing in the city, and that of maintenance of the area's character. It must be noted that housing as such does not necessarily militate against open space if it is appropriately designed. Due to the high land value of the Confluence Area, and the restriction of building height that should be maintained, it may be difficult to make housing affordable to poorer people. Commercial/business land-use would only be suited to the Island if the businesses were present on a small scale and it were to provide for leisure and recreational activities. Restaurants and tea gardens are examples.

In summary, open space/recreational, educational, institutional, housing and small scale recreation-orientated commerce are feasible land-use alternatives for Valkenberg-West Island. With change in land-use, care would have to be taken in this area, especially if small parcels of land are sold off from the institutions, so that cumulative development characteristics do not change the Island's open space character. There should also be no conflict with current land-users such as the hospital which requires a quiet environment. The adherence to the IEM process for development would help avoid this danger.

### 3.3.3 The Eastern Highland

**Description:**

The Eastern Highland land-unit is flanked in the west by the 1:50 year floodline so that the area is above the flood level. The only spatial constraints mapped in this land-unit are the transport network ("immovable") and the Nieuwe Molen Mill in the ACRC.

Current land-use on the Highland is varied with two residential areas (MGV, Berkley Road area), three medical institutions (ACRC, VPH, VH), a commercial area (lower Berkley Road), open space (in MGV, CCC land above Black River) and a golf driving range (on CCC land) (Map 6, BLR). The zoning of the Highland does not require extensive description as it closely follows the land-use, but of consequence is the Single Dwelling Residential zoning of the CCC owned land below MGV (Map 7, BLR). This means the MGV is planned to be expanded at some point in time. The zoning of Valkenberg-East is also important, namely that of Undetermined (ie state use), which means if any portion of the land is sold to non-state bodies, it will require rezoning. The ownership of the land in this unit is a mix of private and public. Private ownership in the area is restricted to the two residential areas, the commercial area, VPH and the land owned by Projection Projects (ex Medical Research Council land). Public ownership comprises the Departments of Community Health and Welfare (ACRC) and Community Development (VH-East) and the CCC land.

**Land-Use Alternatives:**

The Eastern Highland is different in character to the other two land-units as its contact with the rivers is less and it has elements of land-use which are not open space in character, for instance the commercial and residential areas. The Eastern Highland is also more integrated with the city's road network and is not enclosed/cut-off by the two parkways as are the two other land-units. The Eastern Highland is thus very much part of the urban fabric, unlike the river systems which are strongly allied to the MOSS.

Conservation is not a feasible land-use in the area as there are no remaining pristine biological resources. Besides the use of a part of CCC land as a golf driving range, there are no other public recreational facilities, besides those for internal use at the ACRC and VH-East. The Highland does not have a great deal to offer in terms of passive recreation as it largely built up, although the CCC land below VPH does have potential. Picnic facilities could be provided here as the land overlooks the Pallotti wetlands. Recreation is a potential land-use, but this would require a study for demand, as there are formal recreational facilities at Hartlyvale and the adjacent suburbs of Maitland and Pinelands, and there is opportunity for walking/jogging in the other two land-units. Due to the Highland's urban nature, its current mixed land-use and lack of biophysical constraints, it is suited to the siting of housing, commercial, institutional (medical, education, scientific) and light

industrial activity.

The actual siting of these alternatives would have to take into account that new land-use should not conflict with existing land-use in the area. This is especially important for the medical institutions which need relative "quiet". With the current landownership of the area there is little scope for large scale land-use change. If the large medical institutions do not relocate or sell off parts of their property, then there are only two parcels of land presently undeveloped which belong to the CCC and are situated below the VPH and MGV. The MGV parcel appears to be destined for the extension of that village. The privately owned land in the two residential suburbs would not easily undergo large scale change because of the number of landowners involved. Overall therefore, the Eastern Highland, despite its flexibility in terms of land-use alternatives, is unlikely to undergo a large scale change in land-use in the near future.

# CHAPTER 4: A PREFERRED LAND-USE SCENARIO

Chapter 3 outlined the range of feasible land-use alternatives for the Confluence Area. The decision-maker is expected to make an informed decision on land-use policy for the study area, by choosing among the alternatives with reference to the key decision-making criteria of Chapter 2. In this Chapter (4), a preferred land-use scenario is outlined, based on the author's particular perspective on the information previously presented, as well as academic theory. The author takes the liberty in the discussion of this scenario to put forward certain assumptions, as otherwise the current land-use would be very restrictive to the implementation of alternative land-uses. The production of this scenario or "vision" is a speculative exercise, but it is intended to be of use to the decision-maker for the purposes of comparison with his/her own interpretation of key criteria and to stimulate thinking about possible uses of the Confluence Area. The chapter is divided into two sections. In the first section (4.1), the author's view of the role of the Confluence Area within its regional context is presented with reference to academic theory. This in effect sets the overall vision for land-use policy in the area. In the second section (4.2), the specific preferred land-uses for the three identified land-units (see section 3.2) are presented as a land-use scenario.

## 4.1 Proposed Role of the Confluence Area

The single most important structuring element in the Confluence Area are the river systems. The rivers determine urban space around them by way of periodic flood events, they form part of a city-wide green corridor and they provide water for the wetlands and avifauna. In terms of land-use in the study area, the rivers are integrally associated with conservation, recreation and flood control, which are all potential components of open space use. For the Confluence Area this has been recognised by the I&APs interviewed and the CCC's Greening report. Taking this into account, the Confluence Area's proposed role is that of being a link in the MOSS, as well as a flood control area. This role is a broad-based one and on the actual land-unit level the implementation of it varies. To justify this proposed role, reference is made to theory that applies to open space and river management.

The foreword of the Council of the Environment report on guidelines for open space in urban areas makes the point that, if the key element of open space provision in urban areas is not addressed, then the environmental and living quality of our cities will deteriorate rapidly

(Council for the Environment, 1988). The actual approach to the identification of specific land for open space in urban areas varies. Kruger (1988) advocates an ecological approach, where environmentally sensitive areas are set aside for open space, while Wall (1992) advocates a development approach, which identifies sites by their inherent unsuitability for the development of building structures (eg. floodplains, wetlands). Wall points out that traditional open space provision and management will not work in the future, as the priority is to address the needs of the majority of the population in terms of shelter and other survival needs. Accordingly, the single use of open space for conservation is now a luxury and therefore open space needs to be multi-functional to be justified (Wall, 1992). There is merit in this argument, but for extreme conservation crises, for instance the threat to the last remaining populations of a species, the developmental approach should perhaps make exceptions.

The possible functions of open space are numerous and they include the maintenance of life support systems (ecological), the protection of human safety (flooding), recreational opportunity, aesthetic reasons, to accommodate future needs, to address psychological needs (stress relief), to cater for educational needs and the use of it as a structuring element (buffer zones for conflicting land-use) (Kruger, 1988; Wall 1992). Large parts of the study area serve all of these functions, ie it is multi-functional open space, so that the apparently conflicting ecological versus developmental approach is not an issue. However, the study area is not homogeneous and is only partially subject to flooding (3 land-units), therefore there are areas where land is physically suitable for development and there are no ecological restrictions. This does not invalidate the overall role of the study area for MOSS, but rather there needs to be a gradation of open space application, from the core river area to the already developed areas. In effect, the application of this gradation to the land-units means the open space concept is applied at different levels for different land-units.

The importance of the study area as a part of the MOSS also has to be considered in the biogeographical conservation context. The Confluence Area itself may not have a great deal of indigenous vegetation left, but Metropolitan Cape Town as a whole has the highest concentration of endangered species in southern Africa (McDowell, Low and McKenzie, 1991). The study area is ecologically linked to the remaining fragments of Cape Town's plant communities because open space in cities, including gardens, parks, rivers and undeveloped land, can enhance the conservation of plants and animals by forming corridors,

stepping stones and food reservoirs. This is the case, despite the degraded and disturbed nature of most urban open space (Poynton and Roberts, 1985). If the biogeographical conservation value of open space is to be maintained, then the corridors need to be retained and open space should be managed as natural areas and not as manicured parklands (Roberts and Poynton, 1985). The nature of the Confluence Area as partly "wild" and as a part of a river corridor makes it an important biogeographical asset in terms of the MOSS.

The future of the study area is integrally entwined with that of the flood control measures that will have to be implemented to counteract the effects of continuing catchment hardening. Unfortunately, the CCC-commissioned study on the Black River's hydrology, and the possible flood control options, is not yet available. This lack of information on the flood control options hampers analysis, but ideally a more ecologically sensitive approach to flood control should be implemented than the options of river widening or canalisation. This ecological approach has been advocated by Luger and Davies (1993) for the Liesbeeck River. They urge planners not to "straight-jacket" rivers in concrete (canalisation) which reduces their ability to perform their natural cycle of flooding and supporting diverse ecosystems. In practice, some areas in the Black River catchment should be allowed to flood if they are at present undeveloped (the floodplains) and other areas could be investigated for water storage facilities. If there is not land available at present to implement this approach, then it should be made available. The potential saved costs of not implementing river widening could be used for land acquisition.

There are two type of water storage facilities used in flood prevention, namely detention and retention ponds (Corin, 1991). In detention ponds, the run-off is stored temporarily and released, so that these ponds are dry except during major storms. Depending on design, they can resemble landscaped parks and be used for recreation such as playing fields (Miles, 1980). In Cape Town, detention ponds have already been built along the Diep River and apparently the detention ponds are gaining in popularity as a flood control measure (Anonymous, 1989). In retention ponds, water is stored longer and it is allowed to enter the ground water system. Recreationally, they can be used for fishing and boating (Miles, 1980). Either of these pond types could possibly be used in the Confluence Area. The restoration of wetland systems to function as a type of flood retention pond is also a possibility.

## 4.2 Preferred Land-Use Scenario

### 4.2.1 River Floodlands

The River Floodlands are the most strongly affected of the three land-units by the Confluence Area's role as a part of the MOSS and as a flood control area. Two assumptions are made in outlining the preferred land-use for this area. The first concerns the railway land (SARCC and Transnet) in the north-western corner of the study area (Figure 2), which is assumed to be in ownership of the CCC for the purposes of this scenario. As to the possible manner of land transfer (see section 3.3.1). Secondly, the proposed river widening is assumed not to go ahead as the more ecologically sensitive approach of floodland and water storage ponds is deemed to be feasible (see section 4.1).

With an assumption of revised land-ownership in place, the River Floodlands are virtually totally controlled by the CCC with the exception of the lower margins of the SAAO and VH-West properties. This is the ideal situation as the CCC is a public body and the services of flood control are of a public nature. The preferred land-uses for this unit are environmental education, recreation and conservation.

In a report for the CCC on sites of special conservation and education interest in Cape Town, Low (1992) identified the RBS as an important conservation site and an area where environmental education could be developed. An environmental centre dedicated to the area could use the wetlands/avifauna and rivers as an outdoor classroom. There is at present an environmental centre owned by Captrust on the VH property which could possibly be upgraded to fulfil this role.

The RBS, as has been proposed in the past, should be extended to the Pallotti wetlands near the N2. This would afford the area a greater degree of protection. The RBS wetlands themselves should be physically extended to the north, by way of a wetland reclamation project, spanning in an arc around the current Liesbeeck Sportsgrounds. The rationale behind this is that the area is a natural floodplain and should as far as possible be returned to its natural functioning as a wetland. This project would entail the removal of landfill in large rectangular pits, thereby leaving behind a network of earth ridges. Water could be

channelled into these squares via inlet pipes, they could then act as retention ponds such that flooding would be reduced elsewhere. Wetland vegetation would re-establish itself over time and provide habitat for waterbirds and there would be habitat for breeding on the ridges. The actual depth and design of the system would need research and the control of alien vegetation in the vegetation establishment period would be essential. Some of the ridges could be used as walkways for bird-watching and have hides situated along them.

The Liesbeeck Sportsgrounds should retain their function as a recreational facility, for instance as sportsfields or as a golf course, since these can be subject to flooding without undue damage. In effect, the area would serve as a large scale flood retention pond. A golf course could include water features that would also serve as detention ponds. With the option of the golf course, the proviso is to be made that it should be open to the general public, because of the public ownership of the area. The actual demand for the different types of sports facilities that could be implemented needs investigation, but the Liesbeeck Sportsgrounds area, together with the adjacent Hartlyvale sport complex, could be further enhanced as a regional recreation centre. The area has adequate public access via the Observatory railway station and the road system, and if outreach programmes with sponsorship could initiated, poorer communities within a certain radius of the area could also possibly gain access. The CCC could rent/lease out the land for these uses, but overall the profitability of the land-use is not the foremost criterion, since it serves a floodplain function as well.

The Malta-Berkley road link, if implemented in its current alignment, should not affect the wetland reclamation proposal greatly, but it would impact on the old Liesbeeck River course. The need for and impacts of the Malta-Berkley link and the possible Liesbeeck Parkway widening would require EIA's, but on principle the destruction of the old river course should be avoided if possible. It is a part of the original hydrological system and has an ecological role as a part of the greater wetland system in the area.

Further recreational opportunity in the area is the provision of walk and cycleways. Picnic facilities along the Liesbeeck River and lake could also be introduced.

This scenario presented is constrained by the assumption that the river widening need not occur if ICM is implemented and the problem of the CCC acquiring ownership of the

railways land. Nevertheless, this scenario is not impossible, nor improbable, if a concerted effort was made by the CCC and public support was given. The costs of wetland reclamation are also unlikely to be exorbitant in comparison to the overall costs of river widening.

### 4.2.2 Valkenberg-West Island

The Island is integrally part of the open space corridor because of its location between the Liesbeeck and Black Rivers. Cape Town has not greatly made use of its river areas as recreational and tourist assets, probably because of the prominence of other natural features (eg. Table Mountain, the coastline), and the poor water quality of the rivers. The Island presents an opportunity for a type of parkland within which facilities for public use are present. The rivers need not be used directly for recreation, but they represent a backdrop to the Island and could be used for walks and bird-watching along their banks.

It is probably unlikely that the two institutions, the SAAO and VH, will relocate, but especially VH could rationalize its land-use and release land for other purposes. This land could be used for tea gardens, restaurants, botanical garden and open air amusement uses such as miniature golf. The SAAO, even in concurrence with its present use, could be the location for a scientific museum/park and the NMC declared buildings part of scenic walks. These proposals require that land on the island be accessible to the public and this would be a problem if it interfered with the institutions primary functions. Nevertheless, VH for instance, could have areas that are off-limit to the public where patients need it, while in other areas patients could integrate with the general public and local community. The institutions are publicly owned, so that an investigation into increasing accessibility is not unreasonable. At the very least, local communities would benefit from walk and cycle ways.

The Island could potentially be used for housing if land was made available, but it would mean that a unique opportunity for a river parkland in Cape Town would be lost. Housing would also only benefit a certain number of people, while the Island as a public asset could benefit the local communities as well as the whole of Cape Town, and tourism. Densification is vitally needed, but not in areas where the overall social benefit would outweigh the benefit to a restricted number of people.

### 4.2.3 Eastern Highland

Functionally, this land-unit is less linked to the river systems than the other two land-units, except on its western flank. Open space land-use is still a consideration, but it is outweighed by the fact that the Highland presents an opportunity for addressing the infrastructural and service needs of people as well as serving the goal of the densification of Cape Town. Nonetheless, the current land-use is generally not in opposition to this, as the residential areas, the ACRC, VH and VPH do serve the public. If the institutional land were to be released by rationalization of use, or relocation, higher density land-use such as housing and commercial use could be integrated with the currently existing uses. The commercial area could be placed closer to the Black River Parkway where the noise impacts are higher. The housing could possibly be for low- to medium-income people, despite the high land value in the area, if built at a higher density. The type of housing obviously needs investigation, but the density should not be achieved through increasing building height excessively. This would aesthetically intrude on the skyline and reduce the views from and to the Confluence Area. A factor that could support low income housing on the Island is the close proximity of the railway stations which could provide access to places of work. The open space nature of the two other land-units could serve the needs of a expanded residential population in the Highland. The one area within the Highland that is an opportunity for recreation is the CCC land between the Pallotti wetland and VPH. A picnic area with trees would have the view across the Black River into the Confluence Area.

In conclusion, the overall land-use scenario presented in this Chapter does entail a number of assumptions and the economic viability of specific options needs to be investigated, but with vision, creative thinking and public input the scenario could be viable. The alternative is to leave the land "as is", which is a land-use pattern that does not maximise the area's potential and will not decrease development pressure on the area.

# CHAPTER 5: CONCLUSION

This concluding Chapter is divided into three sections. Section 5.1 synthesises the major issues that have been identified in the course of this dissertation and highlights the aspects that need to be considered, addressed or debated in the Confluence Area land-use decision-making process. In section 5.2, under the heading of conclusions, the degree to which the stated aims have been fulfilled and the role of academic theory in this dissertation are addressed. Finally, in Section 5.3, recommendations are presented for consideration by the decision-maker.

## 5.1 Synthesis of Major Issues Identified

In defining the key decision-making criteria through the analysis of individual environmental factors, it became apparent that six issues or "complexes" of issues are especially important for policy land-use planning in the Confluence Area. The issues embody a range of key decision-making criteria that have been identified as well as analysis that has been undertaken during the course of this dissertation. The issues range from the local/regional to the site-specific level, viz: the C-BR redevelopment, the redressing of social imbalances, the concept of public land, land ownership/land-use, open space (MOSS) and flooding/flood control.

The scale of the C-BR area and its redevelopment represents a strong force in shaping the land-use demands on the Confluence Area. Land-use planning cannot consider alternative land-uses in the Confluence Area without considering the demand of the market system for goods and services. If industry, commerce and housing development take place in the C-BR area, then this will affect the viability of possible development in the study area by either increasing or decreasing demand for certain types of development. Of crucial consideration is the affect the C-BR development will have on the relative importance of open space in the Confluence Area. It is conceivable that, if the C-BR area houses or attracts greater densities of people, it will increase demand for recreation and other leisure activity. Alternatively, greater densities of people would also create demand for other commercial services and increase pressure on open space land-use. The future of the study area is intertwined with the C-BR area, so that planning for the two areas needs to go hand in hand. This appears to be the case at present with respect to CCC planning and the "package of plans approach", but care needs to be taken that non-monetary social and ecological considerations are not lost

within the economic drive to revitalise the City.

With the change in government after the 27 April 1994 elections, the emphasis on redressing social imbalances has become, to a certain extent, paramount for city planning. It is inevitable that the Confluence Area needs to be considered in this light, especially with the large areas of land owned by the public (state) institutions. Land-uses such as open space may be considered of secondary importance if benefits to the poor can be gained through the provision of housing, education or job opportunities. Although open space contributes to community well-being, it may only be defensible where the actual physical constraints are too severe to allow other forms of land-use. This in turn means open space use must be multi-functional to be justifiable. Furthermore, redressing imbalances will also further decrease the already small amount of money that is available for the maintenance of open space. Other options for obtaining money for maintenance may have to be considered, for instance, requiring communities benefiting from open space to be responsible for this task, or linking the provision and maintenance of open space to other forms of development (eg.housing).

Related to the issue of redressing the social imbalances is that of "public land". The concept and scope of "public land" needs to be debated within the public realm and state bodies as it touches on the philosophy of the relationship between a government and its people. This is of the utmost importance to land-use in the Confluence Area as a large portion of the area is owned by public institutions/bodies. In the context of change of government and its structures, it has to be asked whether public land should be used for the overall most beneficial use so as to improve the welfare of the public. If the answer is a "philosophical yes", then the transferal of land between government bodies, or a change of land-use, is possible for the land owned by the institutions. This should be considered if they are using the land inefficiently, or are in a non-optimal location. If the land-use of the institutions were rationalised, the released land could be used for open space related use or publicly provided housing. In the past, government departments were generally jurisdictionally autonomous with a focus on a particular public service and were therefore far removed from the overall concept of social good/efficiency. This could possibly change now. In the context of the "public land debate" the land owned by the railways companies of the SARCC, and especially Transnet also needs to be critically examined. If they are deemed to be public, this could increase the land-use options for land owned by them in the Confluence Area.

Non-profit uses, for example flood control, could then be considered.

An important constraint on the alternatives for land-use in the Confluence Area are current land-ownership and land-use. The current land-use has historically been of a general public service nature as well as having an open space character. This sets a precedent for future land-use. Land-ownership embodies a set of rights and the CCC cannot prescribe to land-owners on their use of land, other than by way of the legal system or zoning scheme. The implication of land rights is that if the public institutions do not wish/plan to change their current land-use, then the study area is relatively inflexible to land-use change. For this reason, in contrast to the past, there should ideally be close contact between the CCC and the state departments to ensure that the area can be optimally utilised. Planning should be based on consultation and not rely on "press releases" from other parties.

The Confluence Area is identified as part of the MOSS and the I&APs have a strong preference for open space land-use. In terms of recreation, the study area's open space is underutilised which could place it under pressure to be utilised for other purposes. This underutilisation is partially caused by the lack of CCC open space funding of the area, resulting in an under-provision of facilities. Other causal factors include the general "run-down" nature of the area, lack of access to the area as a whole, lack of access to institutional grounds, and personal security fears. If open space is to be considered a realistic land-use for the future then these factors have to be addressed. Nonetheless, the study area does present an opportunity for strengthening the MOSS system for amenity and conservation purposes. If this opportunity is foregone, a potential asset to the whole of Cape Town would be lost.

The last major issue is that of flooding and flood control of the Black River. At a site-specific level this the most important physical constraint and it is has a strong impact on the current and future land-use of the study area. The 1:50 year floodlevel (5.1m asl) limits land-use within its boundary to that of flood sustainable development (recreation and conservation), while the proposed flood control measure of river widening threatens the wetlands, avifauna and possibly the area's amenity value. It is accepted that some form of flood control is necessary as increased catchment hardening will place areas of Observatory at risk, but strong attention needs to be focused on ICM and not only implementing river widening as a solution. ICM is ecologically far less detrimental than river widening if run-

off control on private properties and flood detention schemes are implemented. ICM is technically difficult to implement, but it does address the cause and not the result of the problem of flooding. A further problem with ICM is that, up to now, the monetary costs of flood control have been the dominant focus. If total costs, monetary and non-monetary, are considered for the river widening compared to that of ICM, different conclusions may be reached to that of a pure monetary analysis (eg. the loss of wetlands is a non-monetary cost). Total net social cost and sustainablity are thus the key criteria that should be considered. Without the wetlands and aquatic avifauna, the Confluence Area would be ecologically in a poorer state and Cape Town would lose a valuable ecological and social resource.

## 5.2 Conclusions

### 5.2.1 Fulfilment of Stated Aims:

The overall stated aim of this dissertation was given in Chapter 1 as to aid the decision-maker in undertaking more informed land-use planning in the Confluence Area (current and future). This aim is considered to have been substantially met as the decision-maker has been presented with an explicit "chain of analysis" of the Confluence Environment, covering biophysical and socioeconomic factors. The production of explicit recommendations for land-use management, identification of key decision-making criteria and feasible land-use alternatives, and the development of a land-use scenario all fulfil the specific aims stated in the introduction.

The words "substantially met" are used for the fulfilment of the overall aim as, ideally, this analysis should have been undertaken by a multi-disciplinary team (see section 1.5). The determination of the significance of the diverse factors analysed would have benefited from specialist input within various fields and other professionals' experience. In some areas, the author was not qualified to undertake judgements and had to rely mostly on the literature because time was limited for consulting experts in those areas. This limitation of multi-disciplinary input is unavoidable, due to the nature of the dissertation, but it is noteworthy for users of this dissertation. Another limitation is that information was lacking on some crucial aspects, especially geotechnical data on soils and the hydrology study on the Black River that is underway at present. A greater depth of information on these aspects would

have made the analysis and its conclusions more specific in these areas.

This dissertation, which is situated in the proposal development phase of the IEM procedure, does not produce a final land-use policy or plan, but it should be of value in focusing further planning in the Confluence Area. The broad expanded landscape approach adopted for this analysis is useful in that it is comprehensive and indicates to the decision-maker which environmental factors are resources, hazards, procedural issues, management issues or policy issues. The analysis of these factors is stepped which allows the decision-maker to follow the logic and "work backwards" if there is disagreement with the analysis or conclusion at any stage. In the narrowing of the analyse's focus, from considering all factors at first, to eventually producing a preferred scenario at the end, the decision-maker also has the option of choosing the level(s) of analysis that is/are suitable for the specific planning requirements. The recommendations indicate areas where current or future management can be improved, the key criteria identify the significant environmental factors that need to be considered, the land-use alternatives the feasible range of spatial land-use options available and the preferred scenario a vision for the study area.

### 5.2.2 Role of Academic Theory:

The "academic theory" used in this dissertation is vital for enabling the environment to be assessed in an integrated and comprehensive manner. The IEM procedure, which this dissertation adheres to, is also based on a comprehensive and holistic approach to the environment and development. The total environment needs to be viewed as a system to enable an understanding of what the overall consequences will be if certain aspects of it are changed or impacted upon. Academic theory helps link the biophysical (ecological, geomorphological, hydrological, etc) with socioeconomic (cultural, political, economic, etc) systems and reveal the feedback that occurs between them. For instance, in the Confluence Area the "simple fact" that the river floods has far reaching ramifications for land-use options, land-ownership, hydrological management, sediment transport, wetlands and so on. None of these factors can viewed in isolation and they must be seen as a part of a greater system.

Academic theory also has a second important role in that it helps set a framework within which the world around us can be evaluated. It is accepted that there will be in the analysis

of issues, at least partly, a subjective element and therefore the process should be as explicit as possible. This dissertation has the "slant" of viewing the Confluence Area through the lens of "sustainable development" which means emphasis is placed on criteria such as efficiency, inter- and intragenerational equity. Not everybody supports this approach and the body of theory behind it, but it is a valid manner of viewing the environment and its management. For the Confluence Area this approach has resulted in stress being placed on equity and the concept of the "public good" and the examination of non-monetary considerations.

## 5.3 Recommendations:

Recommendations for the management of current and future land-use have been formulated in the dissertation during the analysis of environmental factors. They are presented in Table 3 for the consideration of the land-use decision-maker. The recommendations are "mixed" in scale and nature, but they are intended to be a practical aid to planners as well as managers. They are in most cases not "new" as many of them do appear in other reports or contexts, but they present a useful holistic overview of the Confluence Area system on the aspects that need to be addressed therein.

Finally, since this dissertation is intended to feed into the CCC policy planning for the Confluence Area, it is recommended that the CCC follow the principles underpinning the IEM procedure. Not only IEM, but the local and regional importance of the study area requires that any plan or policy undergoes thorough public participation, and that EIA's should be undertaken for specific proposals.

# TABLE 3: RECOMMENDATIONS

| Factor under which Recommended | Recommendation |
|---|---|
| Planning | * The Confluence Area requires a holistic, integrated and comprehensive development plan which is linked to planning in the region as a whole. |
| Current Zoning | * Public participation in the zoning process must be given a high priority.<br><br>* The heights of buildings in possible development proposals need to be carefully considered, especially for the application of departures in the zoning process. |
| Disposal of Public Land | * If public land is sold in the Confluence Area it should be by tender call, be motivated, transparent and accountable.<br><br>* Public land has strategic value and its use should be evaluated against the greater good of society (eg. to address social imbalances). |
| Public Participation | * Public participation should be a high priority in the planning and management of land-use. |
| Road Widening | * The proposed Liesbeeck Parkway widening, if undertaken, would first require a detailed investigation to determine whether it is desirable in the light of the ecological and hydrological aspects of the area.<br><br>* If road widening were to take place in the Confluence Area, then the increased impact of noise pollution and possible mitigatory measures may need to be considered. |
| Proposed Malta-Berkley Road Link | * If the proposed Malta-Berkley road link were seriously contemplated a needs and desirability study, and an alignment study would need to be undertaken in conjunction with an EIA. |
| Security | * If development takes place in the study area which increases public access, then security management would need to be stepped up.<br><br>* Visible policing in the western-half of the Confluence Area needs to be increased to encourage people to use the area recreationally. |
| Wetlands | * Alien vegetation in the wetlands must continue to be controlled.<br><br>* The Rosenfontein wetland should be fully reinstated.<br><br>* Any proposed development in the area should consider the possible impact on the wetlands.<br><br>* The hydrological planning of the rivers needs to take strong account of the important nature and function of the wetlands. |
| Aquatic Avifauna | * Any possible development in the Confluence Area should consider the possible impacts on the aquatic bird populations. |

| Factor under which Recommended | Recommendation |
|---|---|
| National Monuments | * The declared National Monuments must be conserved in the Confluence Area.<br><br>* The National Monuments should be made more accessible to the public and tourists. |
| Archaeological Sites | * A historical and archaeological investigation should be undertaken to attempt to pinpoint sites of interest, so that these can be sensitively dealt with if development takes place.<br><br>* If any development occurs in the study area, the possibility of archaeological finds must be assessed and taken into account. |
| Recreation | * The institutional land should be made more accessible to the public for recreation purposes. |
| Public Services | * The institutions in the study area should investigate their use of the land and rationalize, ie release underutilised land, where necessary. |
| Transport Network | * Footpaths for jogging and walking, and cycleways should be implemented in the Confluence Area. |
| Sewerage | * The sewage overflow near the Rosenfontein wetland needs to be addressed. |
| Flooding | * Integrated catchment management is required for the Liesbeeck and Black River systems.<br><br>* Areas within the 1:50 year flood return interval line (5.1m asl) of the Black River should not be developed upon, unless it is for land-use which sustains flooding without damage. This recommendation should be reviewed to see if the flood level restriction needs to be increased once the Black River hydrological study is complete.<br><br>* A thorough study of the options and trade-offs between "hard" and "soft" flood control measures is required.<br><br>* Public participation is needed in evaluating the flood control options and trade-offs between hydrological, natural environment and development needs.<br><br>* Current management actions of weed clearance and dredging need to be maintained, but they must be undertaken with circumspection because of the ecological impacts. |
| Water Quality | * Integrated catchment management is needed to control pollution sources in the Black and Liesbeeck River catchments.<br><br>* The treatment systems in the sewerage works should be further improved in terms of the quality of water they pump into the Black River. |

| Factor under which Recommended | Recommendation |
|---|---|
| Air pollution | * Any development undertaken in the study area should not contribute to, or worsen the local or regional air pollution problem.<br><br>* If increased traffic flow through the study area were to take place through proposed development, the impact of increased air pollution on the hospitals needs to be considered (eg. lead levels). |
| Noise pollution | * Any proposed development in the Confluence Area should consider the impact of noise levels on the area's users and implement mitigation measures where necessary. |
| Terrestrial Pollution | * The contents and possible toxicity of the landfill material on the SARCC and Transnet land should be established. |
| C-BR Contextual Frameworks | * The formulation of a policy plan for the Confluence Area must be undertaken in tandem with and regard to the C-BR site planning. |
| Observatory Policy Plan | * Methods of improving access to the Confluence Area by Observatory residents needs to be investigated. |
| Greening the City Report | * If private or public development occurs in the study , provision should be made to integrate open space and recreation with development. |
| WCEDF Guidelines for Public Land Release | * The release of public land in the Confluence Area should follow WCEDF guidelines. |

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# APPENDIX A: BASELINE REPORT STUDY TEAM

| | |
|---|---|
| JAN BERGMAN | - Civil Engineering, University of Cape Town |
| LANCE BLAINE | - Civil Engineering, University of Cape Town |
| SADIA CHAND | - Environmental and Geographical Science, University of Toronto |
| JULIE CHURCH | - African Studies and Geography, University of Sussex |
| CHRISTOPHER DALGLIESH | - Business Science, University of Cape Town |
| BRENT RIDGARD | - Zoology and Botany, University of Cape Town |
| PHILIP ROSENTHAL | - Civil Engineering, University of Cape Town |
| EDWARD TILANUS | - Social Science, University of Cape Town |
| HARALD WESEMANN | - Environmental and Geographical Science and Botany, University of Cape Town |

# APPENDIX B: PRIMARY SCREENING AND CLASSIFICATION OF ENVIRONMENTAL FACTORS

| FACTOR | SIGNIFICANT (YES/NO) | CLASSIFICATION | COMMENT |
|---|---|---|---|
| Slopes | No | - | The slopes are gentle in the study area, less than 10 degrees in angle. |
| Altitude | Yes | - | Discussed under flooding. |
| Temperature | No | - | There are no unusual extremes in area, it has the general Cape Town climate. |
| Precipitation | No | - | Important for flooding, but is not a factor on its own for land-use decisions. |
| Wind | No | - | Winds on site are not exceptional compared to other areas in Cape Town. |
| Soils (fertility) | No | - | Soils are generally of low fertility in study area, fertile areas are developed upon. Agriculture is an unlikely option in this area. |
| Soils (bearing capacity) | Yes | Hazard | - |
| Flooding | Yes | Hazard | - |
| Sewage | Yes | - | Discussed under water quality. |
| Sedimentation | Yes | - | Related to management, but is discussed under flooding as it is involved with river hydrology. |
| Stormwater flow | Yes | - | Discussed under flooding. |
| Channels/canals | Yes | - | Discussed under flooding. |
| Weed growth | Yes | - | Discussed under flooding. |
| River widening | Yes | - | Discussed under flooding. |
| Pollution (air) | Yes | Hazard | - |
| Pollution (terrestrial) | Yes | Hazard | - |
| Pollution (noise) | Yes | Hazard | - |
| Terrestrial vegetation | No | - | Area has few indigenous species left, are mostly found in wetlands. |
| Wetlands | Yes | Ecological resource | - |
| Fauna (terrestrial and aquatic) | No | - | Area is impoverished in terms of fauna. |

| FACTOR | SIGNIFICANT (YES/NO) | CLASSIFICATION | COMMENT |
|---|---|---|---|
| Aquatic Avifauna | Yes | Ecological resource | - |
| Water Quality | Yes | Hazard | - |
| Transport network | Yes | Social resource | - |
| Malta-Berkley link proposal (road) | Yes | Management | - |
| Traffic flow | Yes | Management | - |
| Potable water supply | No | - | No difficulties with current supply or increasing supply. |
| Sewerage | Yes | Social resource | - |
| Stormwater infrastructure | No | - | A technical issue that can be addressed through design. Is also "over-ridden" by the flooding problem. |
| Telephones | No | - | Adequate capacity for present and future. |
| Electricity | Yes | Social resource | Supply is not a problem, but there is a high voltage cable on Black River bank which is expensive to move. |
| Gas | No | - | No problems of extending supply if needed. |
| Refuse removal | No | - | Provided by CCC, is not a problem. |
| Archaeological | Yes | Social resource | - |
| National Monuments | Yes | Social resource | - |
| Population growth | No | - | Not a issue in the study area itself. |
| Employment | Yes | Social resource | - |
| Recreation | Yes | Social resource | - |
| Land value | Yes | Social resource | - |
| Security | Yes | Management | - |
| Squatting | No | - | Area is not squatted upon currently and it does not appear a major threat as most of land is occupied by landowners. Unoccupied land near rivers is subject to waterlogging and flooding. |
| Land-ownership | Yes | Social resource | - |

| FACTOR | SIGNIFICANT (YES/NO) | CLASSIFICATION | COMMENT |
|---|---|---|---|
| Land-use | Yes | Social resource | - |
| Zoning | Yes | Social resource | - |
| Planning | Yes | Procedural | - |
| Disposal of public land | Yes | Procedural | - |
| Public participation | Yes | Procedural | - |
| CMA Guide Plan Vol.1 | Yes | Policy | - |
| Greening the City: Open Space and Recreation Plan For Cape Town | Yes | Policy | - |
| IMDF | Yes | Policy | - |
| WCEDF: Guidelines for Public Land Release | Yes | Policy | - |
| C-BR Contextual Frameworks | Yes | Policy | - |
| Observatory Policy Plan | Yes | Policy | - |
| Maitland Local Area Plan | Yes | Policy | - |
| Rondebosch-Mowbray Local Area Plan | No | - | Does not contain information of significance to study area. |
| Salt River-Woodstock-Walmer Estate-University Estate Local Area Planning Process | No | - | Does not contain information of significance to study area. |
| I&AP visions | Yes | Policy | - |

# EXECUTIVE SUMMARY

## CONTENTS

# 1. INTRODUCTION

This dissertation is the individual analysis and evaluation of the information contained in the report titled "Environmental Baseline Study for Land-Use Decisions in the Liesbeeck-Black River Confluence Area". The baseline report (BLR) was compiled by the 1993-1994 Master of Philosophy (MPhil) Class of the Department of Environmental and Geographical Science at the University of Cape Town. The purpose of this dissertation is twofold. Firstly it is submitted as a partial requirement for the MPhil degree in Environmental Science, and secondly it is intended to aid the Cape Town City Council (CCC) in their land-use planning for the Confluence Area.

The Confluence Area is situated 5.5 kilometres east of Cape Town's central business district and measures 232ha in extent. It is bounded by the Liesbeeck Parkway in the west, the N2 in the south, Alexandra Road in the east, and by Berkley Road and the Culemborg-Black River (C-BR) marshalling yards in the north.

# 2. AIMS

The specific aims of the dissertation are to:

- provide the decision-maker with recommendations for managing current and future land-use.

- identify feasible land-use alternatives open to the decision-maker.

- provide the decision-maker with a preferred land-use scenario.

# 3. APPROACH AND METHOD

At an abstract level, the approach implicit in this dissertation is that of "sustainable development", while at a practical level, it is one of an expanded landscape approach (land-use capability study). The Confluence Area is analysed under the categories of resources,

hazards, management factors, procedure of planning, and local/regional policy.

To fulfil the specific aims a four step procedure is undertaken:

**Step 1:** The environmental factors are extracted from the BLR and given a primary screening to focus further analysis. The remaining factors are classified into the categories listed in the preceding paragraph.

**Step 2:** The factors are then analysed to formulate recommendations for addressing problem areas and to produce key site-specific and local/regional decision-making criteria for the evaluation of land-use alternatives.

**Step 3:** Firstly, the local/regional key decision-making criteria are evaluated to produce feasible land-use options. Secondly, a number of site-specific criteria (spatial constraints) are mapped and land-units are identified from the most important spatial constraint. Finally, feasible land-use alternatives are produced by the evaluation of the land-use options together with the key criteria.

**Step 4:** A preferred land-use scenario or "vision" is presented which is based on the author's interpretation of the key criteria and theoretical literature, but it does not constitute a qualified land-use plan.

# 4. RESULTS

## 4.1 KEY DECISION-MAKING CRITERIA

A total of 33 environmental factors, 8 local/regional and 25 site-specific, are analysed to derive key land-use decision-making criteria. There are a total of 46 key criteria which are compiled into tables.

## 4.2 LAND-USE ALTERNATIVES

**Land-Use Options:** The overall range of feasible land-use options for the Confluence Area

is identified as:

* open space/recreation/conservation (biological)
* housing
* commercial/business
* industrial (except heavy)
* institutional (medical, educational, scientific)

Of these, open space related land-use is most strongly advocated and identified by Interested and Affected Parties (I&APs), policies and plans.

**Land Units:** The 1:50 year floodline (5.1m above sea level) is the most important spatial constraint in the study area, as it limits land-use within its boundary to flood-sustainable development. Three land units are identified: the "River Floodlands" which are within the floodline, the "Valkenberg-West Island" and the "Eastern Highland" which are above the floodline.

**Land-Use Alternatives:**

* The **River Floodlands** are an integral part of the Metropolitan Open Space System (MOSS). The spatial constraints present within them are the transport network, the CCC road reserves, the wetlands, alluvial deposits and a high voltage powerline. However, the most important constraint is the flood risk which limits land-use to flood-sustainable development. Hence the land-use alternatives are open space, some forms of recreation (without building structures), and conservation.

* The **Valkenberg-West Island** has the spatial constraints of three National Monuments Council declared buildings, but overall the constraints posed by the current land-use and the unit's open space character are important. The Island's largest landowners, the Astronomical Observatory and Valkenberg Hospital, have no plans to relocate, although the Hospital could release land through rationalization. Historically, the land-unit has had a land-use of a public service nature which does set a precedent. The Island is also integrally a part of MOSS as it is "sandwiched"

between the two rivers, although it is biologically depauperate. Due to the open space character and the public service history, the land-uses of open space/recreation, institutional, housing (low density) and small scale recreation orientated commerce are considered feasible. If implemented with care, these need not impact on the open space character or the current land-owners.

* The **Eastern Highland** has a more urban character as it has little contact with the river systems and it has a mixed land-use including residential, institutional and commercial use. The only spatial constraint is one National Monument, but current land-use is also a constraint to land-use change and again mainly depends on the rationalization of institutional land. Because of the Highland's urban character, its current mixed land-use and lack of major spatial constraints, it is suited to the siting of housing, commercial, institutional and light industrial activity.

## 4.3 PREFERRED LAND-USE SCENARIO

The author views the Confluence Area's local and regional role as being a link within the MOSS as well as a flood control area. There is support for this role in the academic literature, including the multiple benefits of open space and the case for ecologically sensitive flood control, consisting of floodplains with de/retention ponds and wetlands.

The following preferred land-use scenario entails a number of assumptions and the economic viability of suggestions needs to be investigated. Nevertheless, it is felt that with creative thinking, vision and public support it is not totally unrealistic.

* In parts of the River Floodlands wetlands should be re-established (the northern South African Rail Commuter Corporation (SARCC)/Transnet land) and other areas should be used for flood-sustainable recreational facilities (Liesbeeck Sportsgrounds, CCC land). The ideal is that the CCC should gain ownership of the study areas railway's land to manage it for the public. The area could further be strengthened as a regional recreation centre, if access to outlying communities is improved.

* The **Valkenberg-West Island** is a potential recreational and tourist asset for Cape Town and could be used as a type of parkland which includes facilities for public use.

Tea gardens, botanical garden, science park/museum and other open-air amenities can be considered as these do not negate the open space character. The rationalization of institutions could free land for these purposes and the institutions could coexist with these activities.

* Institutional rationalization is also advocated for the **Eastern Highland** which could be used for low to medium income housing and commercial activity. This would serve the city's need for densification and provision of housing and employment.

# 5. CONCLUSION

## 5.1 MAJOR ISSUES IDENTIFIED

In the analysis of the Confluence Area it is apparent that there are six issues that need to be especially considered. They are:

* The **C-BR redevelopment** will strongly influence the type of land-use that will occur in the study area with regard to affecting the demand for and viability of land-use alternatives. The mutual planning for the two areas is essential, but the ecological issues must not be totally overlooked for economic considerations.

* With the new government in place the emphasis on **redressing social imbalances** will probably be virtually paramount in city planning. The implication is that, although open space contributes to social welfare, it may only be defensible where the actual physical constraints are too severe to allow other types of development. Alternative forms of open space funding also need to be found.

* The concept and scope of "**public land**" needs to be debated within the public realm and state bodies. If public land should be used for the overall most beneficial use for the public's welfare, then the transferal of land between state departments and rationalization or change of land-use are possibilities in the Confluence Area. The status of Transnet and the SARCC and the extent of their public responsibility also have important land-use implications.

* The CCC cannot prescribe to the state institutions on land-use as they have land-ownership rights. Nonetheless, there should be closer cooperation between the CCC and the state departments to ensure optimum land-utilisation.

* There is a strong emphasis on the MOSS by I&APs, policies and plans, but the current underutilisation of the study area places pressure for other types of development. The factors causing underutilisation (CCC amenity under-funding, public's security fears, area's public inaccessibility) need to be addressed if open space is to be a viable land-use in the future. The study area presents an opportunity for strengthening the MOSS which should not be foregone.

* Flooding and flood control is the most important issue in the study area. Although flood control is needed, emphasis needs to be placed on Integrated Catchment Management (ICM) as it addresses the cause and not the result of flooding. ICM can be ecologically less detrimental than the "local" flood control options of river widening or canalisation, and it may not be that expensive, if the non-monetary costs are factored in as well (eg. destruction of wetlands). Total net social cost and sustainability should be the key criteria.

## 5.2 FULFILMENT OF STATED AIMS

The stated aims are considered to have been substantially met as the decision-maker is presented with a comprehensive, explicit chain of analysis of the total Confluence Area Environment. Ideally, however, this type of analysis should be undertaken by a multi-disciplinary team as this could have improved the depth and accuracy of analysis. Another limitation is the lack of information on some aspects, especially geotechnical data on soils and the hydrology study of the Black River that is currently underway.

## 5.3 ROLE OF ACADEMIC THEORY

Academic theory is found to be vital for enabling the environment to be assessed in an integrated and comprehensive manner. It is needed to link the biophysical and socioeconomic systems and reveal the feedback that occurs between them. Furthermore, academic theory helps set a framework for viewing and evaluating the environment, for

example "sustainable development".

# 6. RECOMMENDATIONS

Recommendations have been formulated for the management of current and future land-use. They are presented in Table 1 for consideration by the land-use decision-maker. Finally, since this dissertation is intended to feed into the CCC policy planning process for the Confluence Area, it is recommended it follow the principles underpinning the IEM procedure. The local and regional importance of the Confluence Area requires this.

## TABLE 1: RECOMMENDATIONS

| Factor under which Recommended | Recommendation |
|---|---|
| Planning | * The Confluence Area requires a holistic, integrated and comprehensive development plan which is linked to planning in the region as a whole. |
| Current Zoning | * Public participation in the zoning process must be given a high priority.<br><br>* The heights of buildings in possible development proposals need to be carefully considered, especially for the application of departures in the zoning process. |
| Disposal of Public Land | * If public land is sold in the Confluence Area it should be by tender call, be motivated, transparent and accountable.<br><br>* Public land has strategic value and its use should be evaluated against the greater good of society (eg. to address social imbalances). |
| Public Participation | * Public participation should be a high priority in the planning and management of land-use. |
| Road Widening | * The proposed Liesbeeck Parkway widening, if undertaken, would first require a detailed investigation to determine whether it is desirable in the light of the ecological and hydrological aspects of the area.<br><br>* If road widening were to take place in the Confluence Area, then the increased impact of noise pollution and possible mitigatory measures may need to be considered. |
| Proposed Malta-Berkley Road Link | * If the proposed Malta-Berkley road link were seriously contemplated a needs and desirability study, and an alignment study would need to be undertaken in conjunction with an EIA. |

| Factor under which Recommended | Recommendation |
|---|---|
| Security | * If development takes place in the study area which increases public access, then security management would need to be stepped up.<br><br>* Visible policing in the western-half of the Confluence Area needs to be increased to encourage people to use the area recreationally. |
| Wetlands | * Alien vegetation in the wetlands must continue to be controlled.<br><br>* The Rosenfontein wetland should be fully reinstated.<br><br>* Any proposed development in the area should consider the possible impact on the wetlands.<br><br>* The hydrological planning of the rivers needs to take strong account of the important nature and function of the wetlands. |
| Aquatic Avifauna | * Any possible development in the Confluence Area should consider the possible impacts on the aquatic bird populations. |
| National Monuments | * The declared National Monuments must be conserved in the Confluence Area.<br><br>* The National Monuments should be made more accessible to the public and tourists. |
| Archaeological Sites | * A historical and archaeological investigation should be undertaken to attempt to pinpoint sites of interest, so that these can be sensitively dealt with if development takes place.<br><br>* If any development occurs in the study area, the possibility of archaeological finds must be assessed and taken into account. |
| Recreation | * The institutional land should be made more accessible to the public for recreation purposes. |
| Public Services | * The institutions in the study area should investigate their use of the land and rationalize, ie release underutilised land, where necessary. |
| Transport Network | * Footpaths for jogging and walking, and cycleways should be implemented in the Confluence Area. |
| Sewerage | * The sewage overflow near the Rosenfontein wetland needs to be addressed. |

| Factor under which Recommended | Recommendation |
|---|---|
| Flooding | * Integrated catchment management is required for the Liesbeeck and Black River systems.<br><br>* Areas within the 1:50 year flood return interval line (5.1m asl) of the Black River should not be developed upon, unless it is for land-use which sustains flooding without damage. This recommendation should be reviewed to see if the flood level restriction needs to be increased once the Black River hydrological study is complete.<br><br>* A thorough study of the options and trade-offs between "hard" and "soft" flood control measures is required.<br><br>* Public participation is needed in evaluating the flood control options and trade-offs between hydrological, natural environment and development needs.<br><br>* Current management actions of weed clearance and dredging need to be maintained, but they must be undertaken with circumspection because of the ecological impacts. |
| Water Quality | * Integrated catchment management is needed to control pollution sources in the Black and Liesbeeck River catchments.<br><br>* The treatment systems in the sewerage works should be further improved in terms of the quality of water they pump into the Black River. |
| Air pollution | * Any development undertaken in the study area should not contribute to, or worsen the local or regional air pollution problem.<br><br>* If increased traffic flow through the study area were to take place through proposed development, the impact of increased air pollution on the hospitals needs to be considered (eg. lead levels). |
| Noise pollution | * Any proposed development in the Confluence Area should consider the impact of noise levels on the area's users and implement mitigation measures where necessary. |
| Terrestrial Pollution | * The contents and possible toxicity of the landfill material on the SARCC and Transnet land should be established. |
| C-BR Contextual Frameworks | * The formulation of a policy plan for the Confluence Area must be undertaken in tandem with and regard to the C-BR site planning. |
| Observatory Policy Plan | * Methods of improving access to the Confluence Area by Observatory residents needs to be investigated. |
| Greening the City Report | * If public or public development occurs in the study , provision should be made to integrate open space and recreation with development. |
| WCEDF Guidelines for Public Land Release | * The release of public land in the Confluence Area should follow WCEDF guidelines. |